

# The Iron Age

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## A New Form of Spring for Electric and Other Measuring Instruments.

In steam and gas engine indicators the pressure of the fluid on a piston produces a slight shortening of a spiral spring, which is magnified by a lever, and so the pressure of the steam or gas is recorded. In what are usually known as spring balances there is also occasionally a magnification of the elongation of a spiral spring affected by the use of a rack and pinion. Such magnifying arrangements, however, not only introduce inaccuracy by the bad fittings of hinges or of teeth, an inaccuracy which is aggravated by wear, but they increase the cost of measuring instruments and their liability to get out of order.

As an example of the difficulty of using the wheel and pinion for the magnification of an angular motion produced by a small force, Prof. W. E. Ayrton and John Perry, in a paper recently read before the British Royal Society, mentioned the fact that although they used this plan for a year or more in their electric measuring instruments, and although the wheels and pinions were made by a good watchmaker, still the friction involved in such a plan induced them to abandon it in favor of a new arrangement described below. The telescopic method employed by Weber, and the spot-of-light method due to Sir W. Thomson, for magnifying the effect of an angular motion are, of course, unequalled for stationary measuring instruments, but for instruments which must be carried about and used quickly, without the necessity of adjustment, these most ingenious reflecting methods are quite unsuitable.

With an ordinary cylindrical spring having a small angle between the osculating plane and a plane perpendicular to the axis, as is the case with all spiral springs such as are in practical use, it is well known that but very little rotation is produced between its ends by the application of an axial force.

Consequently, with such springs it is only possible to obtain magnification by the employment of a system of levers, or of a rack and pinion. It occurred to the authors, therefore, to consider whether it would not be possible to make a spiral spring of such a nature that for a comparatively small axial motion of its ends there should be considerable rotation of one end relatively to the other, and by the employment of which all levers, racks and pinions could be dispensed with, so that no error could be introduced by wear and tear or by want of fitting of joints, and, further, so that the temperature correction should be merely one affecting the rigidity of the material used as a spring, and not a correction such as had to be applied in consequence of the contractions and expansions of the various parts of an ordinary magnifying apparatus.

The theory of the strength and stiffness of the ordinary cylindrical spiral spring of small angle was given for the first time in 1848 by Prof. James Thomson, and Professors Ayrton and Perry followed this method in investigating the laws governing the behavior of spiral springs generally. They found that if the centers of all cross-sections of the wire or strip forming the spring lie on a right circular cylinder of radius  $r$ ; if the spiral have everywhere an inclination,  $\alpha$ , to the plane perpendicular to the axis of the cylinder, and if a force,  $F$ , act at one end of the spring along the axis, the other end of the spring being fixed; if  $B$  is the flexural rigidity of the wire in the osculating plane, and if  $A$  is the torsional rigidity about the spiral line at any place: if the angular motion, in a horizontal plane, of the free end of the spring relatively to the fixed end to be called  $\phi$ , and if the axial increase of length be called  $d$ , and the whole length of the spring along the spiral  $l$ , then

$$\phi = l F r \sin \alpha \cos \alpha \left( \frac{1}{A} - \frac{1}{B} \right) \dots (1).$$

$$d = l F r^2 \left( \frac{\cos^2 \alpha}{A} + \frac{\sin^2 \alpha}{B} \right) \dots (2).$$

Assuming for the general investigation that the cross-section of the wire is elliptic, it is found that the rotation of the free end of a spring, like Fig. 5 or Fig. 6, is greater the greater the inequality in the principal diameters of the elliptic section.

In Fig. 5 it is found that there is an uncoiling on the application of an axial pull. Fig. 6 shows a spring made of the same material, but the wire has been passed through rolls, so as to flatten it in the opposite way, and now a rotation tending to coil it up is found to be produced by the application of an axial pull.

The twisting torque to which the spring is subjected is  $F r \cos \alpha$ , and the bending torque to  $F r \sin \alpha$ . But the twist must be multiplied by  $\sin \alpha$ , and the bend by  $\cos \alpha$  when we project these motions on a horizontal plane. So far, then, as the total rotation in a horizontal plane of the free end of the spring relatively to the fixed end is concerned, it may be regarded as being produced by equal twisting and bending torques, each of them equal to  $F r \sin \alpha \cos \alpha$ ; and the total rotation of the free end of the spring relatively to the fixed end, which is the special feature of the springs considered, is proportional to the difference between the two angular rotations produced in the wire by these equal bending and twisting torques. The twist alone would cause an increase in the number of coils—that is, a rotation in the direction of coiling which is the positive direction—while the bending, or rather the unbending, alone would cause a negative rotation, or one tending to uncoil the spring.

to determine the dimensions of the spring which would give the largest amount of rotation with the minimum amount of stress in the material. Having made their calculation of the greatest amount of stress, the general conclusions arrived at are that in order, with a given axial force, to obtain a large amount of turning of the free end of the spring, combined with small maximum total stress in the material, and not too much axial motion of the free end of the spring, the strip of elliptic section should be as long and as thin as possible, should be wound in a spiral such that the osculating plane makes an angle of  $40^\circ$  to  $45^\circ$  with a plane perpen-

dicular to the axis of the spiral, and so that the smaller diameter of the elliptic section is at right angles to the axis of the spiral.

In the springs employed by the authors in measuring instruments the edges of the strip nearly touch one another in consecutive coils, so that the strip forms almost a continuous cylindrical surface, the angle of the spiral being  $45^\circ$ , the cross-section of the strip being rectangular, and they find the following laws:

$$\phi = \frac{l F r}{b^2} \left( \frac{1}{4N} - \frac{1}{E} \right)$$

$$d = \frac{l F r}{b^2} \left( \frac{1}{4N} + \frac{1}{E} \right)$$

where  $f$  is the greatest stress in the material,  $b$  the thickness of the strip,  $N$  the modulus of rigidity, and  $E$  Young's modulus for the material. The authors show how their springs may be used to determine directly the ratio of the modulus of rigidity of a material to its Young's modulus, and they conclude their paper by describing some practical applications of their springs which they have already made in measuring instruments.

manent set in the direction in which we wish it to be afterward strained in ordinary working.

In spite of the fact that Prof. J. Thomson, in the Cambridge and Dublin Mathematical Journal, November, 1848, explained the importance of initial strains in materials, the reason is not yet sufficiently well understood why, when a round bar has been well twisted beyond the limit of permanent set in a certain direction, it has twice as much elastic strength to resist torsion in this direction as in the opposite direction. Now, in the very act of manufacturing these springs—that is, in the bending of the strip—the material acquires strains which are just opposite in character to the initial strains which we wish it to possess, for, as already explained, if the spring be constructed as in Fig. 5, p. 5, an extension to the spring produces a rotation tending to uncoil it. Hence a spring must not be regarded as ready for use until it receives a good set by means of a weight hung from its end. This instrument is direct-reading, the adjustment for sensibility being made by a small sliding coil, the correct position of which is initially determined experimentally by the makers, and in which position the coil is permanently fixed.

*Theory of the Solenoid Spring Ammeter or Voltmeter.*—If  $C$  is the current in amperes flowing through the coil, the attractive force on the iron core is

$$\frac{K C^2}{1 + S C}$$

where  $S$  is a constant, which is the greater as the current is smaller, for which the iron tube  $A$ , Fig. 1, becomes saturated with magnetism. The position of this iron in the solenoid is so selected that  $K$  remains practically constant throughout the small range of downward motion of the core.

Since the rotation  $\phi$  has been produced by an axial force, we know from the theory of the spring, already given, that this axial force is  $p \phi$ , where  $p$  is some constant. Hence

$$p \phi = \frac{K C^2}{1 + S C}$$

and since  $S C$  is great in comparison with unity for such currents as we wish to measure, we have

$$\frac{p \phi}{K} = \frac{C}{S} - \frac{1}{S}$$

or

$$C = \frac{S p \phi}{K} + \frac{1}{S}$$

that is, equal divisions of the scale correspond with equal additions to the strength of the current except close to the zero, and the authors do not usually graduate these instruments within 5° of the zero.

*Shielded Measuring Instruments.*—When it is desired to use the instrument close to a dynamo machine or electro-motor in action, they have adopted a different and somewhat special form of construction, which is shown in Fig. 2, by means of which the instrument is to a great extent shielded from even powerful external magnetic fields. In this instrument the electro-magnet consists of a hollow core, part of which,  $B B$ , is of charcoal iron, and part,  $D E$ , of brass or other non-magnetic metal. The outside tube  $C C$  and the plates  $X X$ , top and bottom, are also of charcoal iron. The space  $F F$  is filled with insulated wire or strip in electric connection with the terminal, so that when a current is sent through the instrument an intense magnetic field is formed between  $D$  and  $E$ , which are the poles of the electro-magnet. To the iron tube  $A A$ , also made of charcoal iron, the spiral spring, in this case made of extremely thin, hard steel, is attached, the other end being attached to the piece  $F$ , which is fixed relatively to the bobbin. The spindle  $G G$ , which is fixed to the moving iron core  $A A$ , moves freely in bearings  $H H$ , so that the only movements of which  $A$  is capable are one of rotation and one parallel to the axis of the bobbin. As the iron core  $A$  projects into the strong magnetic field between  $D$  and  $E$ , it is strongly attracted toward  $E$  when the current flows, and, as before, causes a large rotation of the pointer  $P$  over the scale. As a means of varying the power of the instrument an adjustable iron piece,  $K$ , is provided, which can be screwed nearer to or further from the core  $A$ , and by the use of which the sensibility of the instrument can be adjusted so as to make the instrument "direct-reading"—that is to say, each division of the scale can be made to correspond with 1 ampere of current or 1 volt difference of potential, and the employment of a constant such as 1.34 amperes or volts per degree, which has hitherto been necessary with our measuring instruments, is now avoided. This power of adjustment produced by the use of the movable iron piece  $K$ , combined with the ease with which more or less wire can be wound on to the instrument, which also constitutes a second adjustment of sensibility, is of considerable importance, since the employment of a constant has not only led to error and delay in measurements made in electric-light factories, but has caused the

(Continued on page 5.)

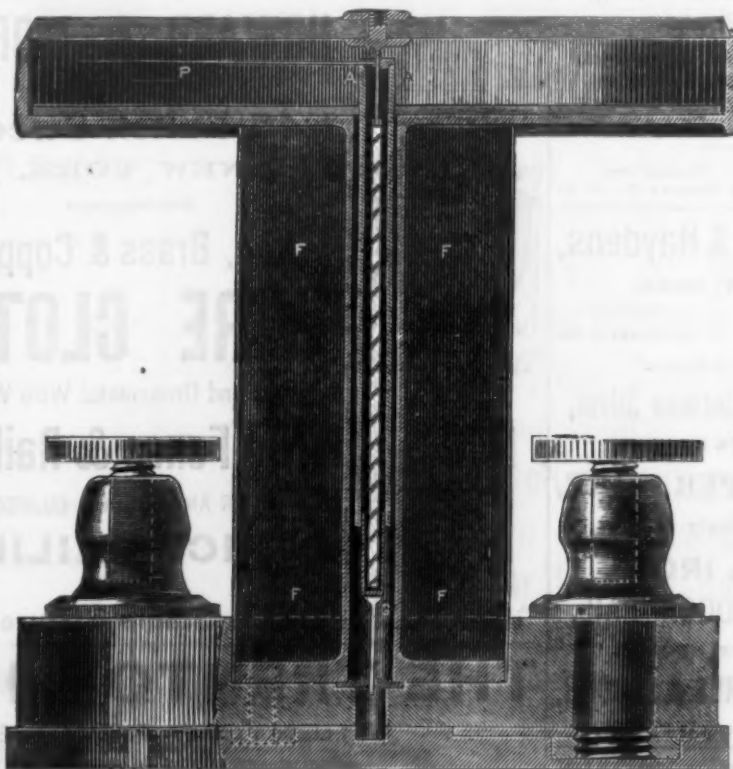


Fig. 1.—Application of Spring in Electric Measuring Instrument.

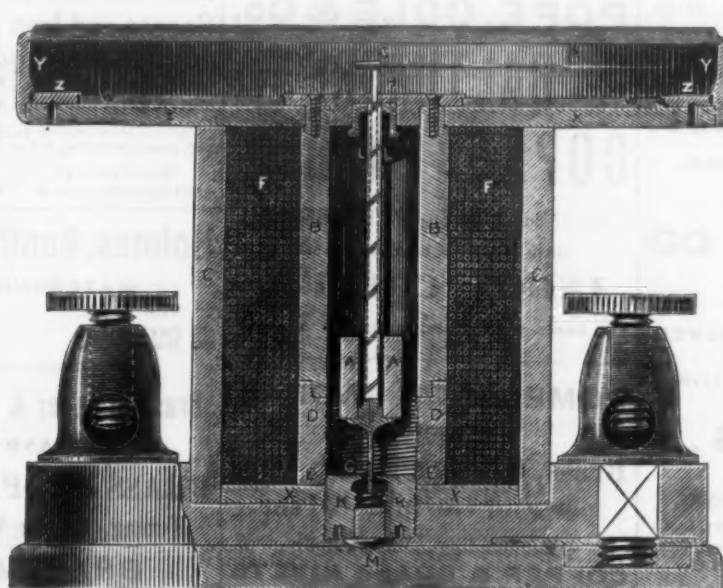


Fig. 2.—Shielded Measuring Instrument.



Figs. 3 and 4.—Weighing Machinery with New Form of Spring.

## A NEW FORM OF SPRING FOR MEASURING INSTRUMENTS.

dicular to the axis of the spiral, and so that the smaller diameter of the elliptic section is at right angles to the axis of the spiral.

In the springs employed by the authors in measuring instruments the edges of the strip nearly touch one another in consecutive coils, so that the strip forms almost a continuous cylindrical surface, the angle of the spiral being  $45^\circ$ , the cross-section of the strip being rectangular, and they find the following laws:

$$\phi = \frac{l F r}{b^2} \left( \frac{1}{4N} - \frac{1}{E} \right)$$

fixing it so that it projects into the solenoid a fixed distance which has been carefully determined by experiment, and by constructing the spring in conformity with the conditions worked out in this paper, so as to obtain a large rotation with minimum stress, and with not too much axial motion of the free end of the spring, they have succeeded in obtaining deflections up to  $270^\circ$  directly proportional to the current, and without any permanent set being given to the spring. To prevent a spring taking a permanent set for a large deflection, it is of great importance that the spring, after being delivered by the maker, should receive a large degree of per-

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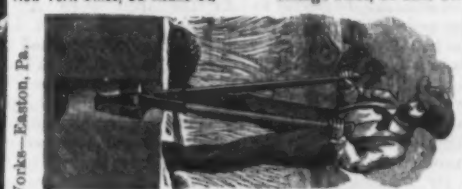
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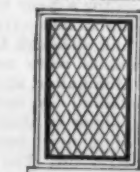
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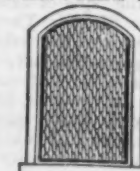
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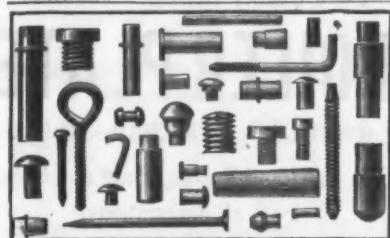


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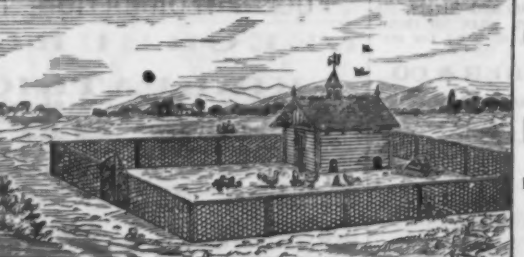
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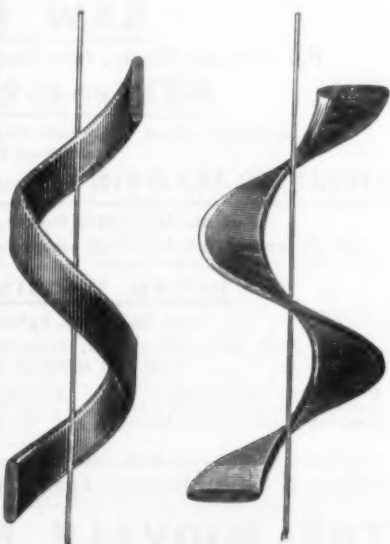
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(Continued from page 1.)

breakage of the pointer or the destruction of an instrument from a far too powerful current being sent through it by an observer (often a man with little experience in the employment of instruments) having confounded the constant of some other instrument with that of the one he was using. In the first of these magnifying spring ammeters and voltmeters made by the authors the instrument did not show the direction of the current, but they have since added on the base of the instrument a small compass needle (not seen in the accompanying illustrations) which points out at which of the terminals the positive current enters, while the main pointer of the instrument shows as before the magnitude of the thing to be measured.

**Weighing Machines.**—Another class of instruments in which they have practically employed this spring are weighing machines, and Fig. 3 shows one of the arrangements adopted. The scale-pan is prevented from turning by the part A B being square and fitting very loosely a square hole in C. This arrangement introduces practically no friction, and prevents the moment of inertia of the scale-pan and load interfering, by means of a rotatory motion, with the rapidity with which the pointer comes to rest when a load is put into the pan. The position of the pointer P, which revolves when a weight is placed in the scale-pan, is read off upon the spiral scale D, which in the specimen shown was graduated in pounds. In another of these weighing machines, shown in Fig. 4, the arrangement is the same with the exception that a cylindrical scale, D, is fixed to the end of the spring and turns with it; the pointer P fixed on the frame of the instrument points to an indication of the weight on a spiral line drawn on the cylinder D. This second ar-



A New Form of Spring for Measuring Instruments.—Figs. 5 and 6.—Springs Flattened in Opposite Directions.

range allows of the employment of springs whose ends have a relative motion of five or six revolutions. The authors also brought before the Royal Society a model showing a combination of bifilar and spiral spring suspension, in which great rotation and small axial lengthening or shortening are produced by an axial force.

**Curious Railway.**—Some interesting particulars regarding a curious railway at Falcon Cliff Castle, on the Isle of Man, have recently been supplied by a British railroad journal. The railway, as described, consists of an up and a down line of 4 foot gauge, running parallel for about 50 yards on a gradient of about one in three. The vehicles, two tramway cars, are moved by water poured into an iron tank upon which each car rests, and the running is controlled by a stationary hand-brake. The tank is of angular shape and rests upon four wheels of the usual railway-coach pattern, with a single flange on the tire. The shape of the tank necessitates two of the wheels being placed lower than the other two, while the body of the car, resting on the horizontal line of the angle, admits of its preserving a perfect level, although running on so enormously steep an incline. A cable, permanently fixed at each end to the cars, runs in the center of the 4-foot gauge and round a wheel about 6 feet in diameter stationed at the top of the gradient. The brake referred to is upon this large wheel. The length of the cable is such that, when one car on one pair of rails is at the top of the gradient, the other upon the parallel pair of rails is at the bottom. The tanks upon which the cars are fixed are fed with water at the top of the incline and emptied at the bottom, the weight of water in the filled tank being sufficient to sink this car to the bottom of the gradient, and at the same time, by means of the attached cable, to draw upon the car and pass-mechanism for filling the tanks can be worked by the same man who has charge of the brake of the wheels upon which the cable revolves, and by means of which the speed of the running of the cars is controlled.

The following story is told by *Engineering*: "A bought a second-hand boiler on speculation and stored it with B; not being able to 'stick' any one on it in a year and a half, A gave the boiler to B for the storage charged. B sold the boiler to C for \$50; C ran it for a while and sold it to D for \$90, which was altogether too much profit. D seems to have had a little decency in him, for after working the boiler a little while he sold it to E for only \$10 advance on what he paid for it. There is no knowing what price E would have got for it, because, fortunately, it burst 'on him.'"

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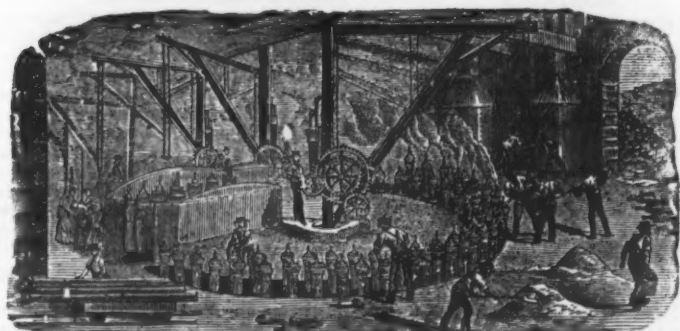


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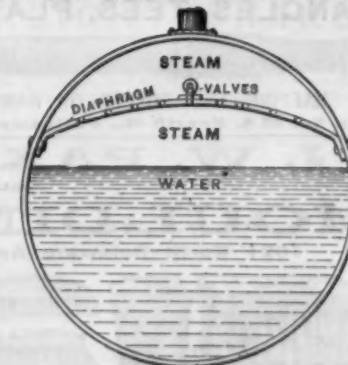
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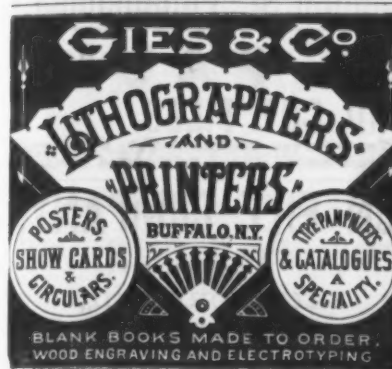
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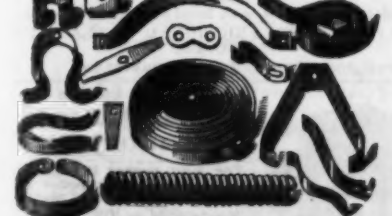
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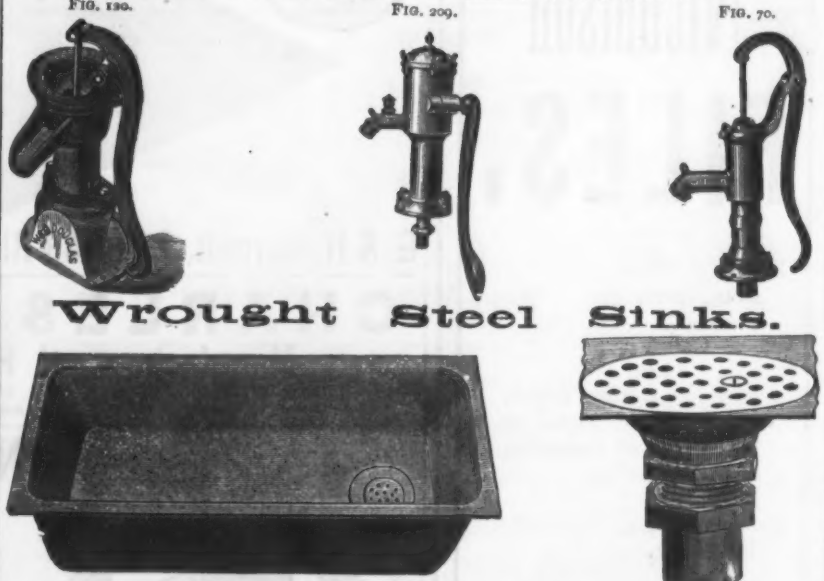
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**Heat-Conducting Power of Materials.**

The following account of a series of experiments made upon various materials for the purpose of determining their heat-conducting power was given in a paper read by Mr. J. J. Coleman, before the Philadelphia Society of Glasgow:

In the last edition of the "Encyclopedia Britannica," Sir William Thomson calls attention (in the article "Heat") to unsatisfactory and inaccurate figures which have been put forward by Peclet as to the conducting power for heat of various solids. In regard to metals proper, more correct results have been achieved by the late Principal Forbes, of Edinburgh, Professor Tait and others. In all treatises upon heat Peclet's figures relating to the conducting powers of fibrous and spongy substances, such as cotton, wool, sawdust, &c., are assumed as correct, and possibly they may be, but they are deficient in giving practical information to those who require to construct insulated cold chambers for the preservation of ice and similar technical purposes.

I have therefore had occasion to make a number of experiments on the subject, which, beside their practical utility, I venture to think are of scientific interest. The apparatus used in my first series of experiments, which were commenced in June, 1883, consisted of 10-inch cubes of thin tin plate filled with ice, placed inside 18-inch cubes of thin tin plate, the space between the two cubes being filled with the substance to be tested. A number of these cubes were placed side by side in a room kept at a uniform temperature of about 60° F., the ice melted per hour being drawn off and measured, from which the quantity of heat penetrating into the ice was easily calculated. It will be seen that this apparatus in its general features resembles the Lavoisier calorimeter, designed for measuring specific heat, but I am not aware that this principle has been adopted before for measuring thermal conductivity. The results of the experiments are summarized in Table I:

cube. This was surrounded by an outer layer of charcoal 3 inches thick, and an outer wall of wood (deal) 1 inch thick. It was found that under these circumstances the ice melted at the rate of about 1 pound per 24 hours for every superficial foot of insulation. Although silicate cotton stands at the head of the list as an insulator, 10 inches thick being equivalent to, say, 12 inches or 15 inches of wood charcoal, it by no means follows that it is always the best substance to use. To begin with, it is four times, or perhaps six times, as costly as charcoal, and has the fault of being friable and liable to fall into powder, especially if used on board ship, from the incessant motion of the vessel when out at sea.

**Sun Kinks.**

One of the daily papers of New York recently contained an article descriptive of a railroad accident, under the heading, "Derailed by a Sun Kink." The title doubtless puzzled many readers. The term indicates that the rails were thrown out of line by expansion, due to the heat of the sun. Few accidents are attributed to this cause, though it may be responsible for more than are supposed. The following, from the September number of the *Popular Science Monthly*, may prove interesting in connection with this matter:

The expansion of metals under the influence of heat is very slight. A mile of iron rails, for an elevation of temperature of 100° F., only expands 2 feet 8½ inches. This is so little as to be readily taken up by the 176 joints that exist in that length of rails. If the rails were laid in very cold weather, in solid contact with each other, then, on a warm, sunny day, a considerable displacement could be produced. To find the maximum for the mile of rails, we must suppose that the line breaks in the middle, and bulges out like a flattened letter V. In this condition of things, the broken line of rail, with the original line for base, would form

TABLE I.—EXPERIMENTS COMMENCED JUNE 14, 1883—4.45 P. M.  
Ice Melted with Different Insulators Measured in Cubic Centimeters.

Date.	Sil. cotton. Cub. cent. ice melted.	Hair felt. Cub. cent. ice melted.	Charcoal. Cub. cent. ice melted.	Wood shaving. Cub. cent. ice melted.	Breeze. Cub. cent. ice melted.	Wood and air space. Cub. cent. ice melted.	Temp. Fahr. outside box. Fahrenheit.
June 15, 10 a. m.	880	807	800	745	1635	1560	Deg. 63
June 15, 6 p. m.	250	305	330	350	700	720	65
June 16, 10 a. m.	815	940	943	985	1810	2220	71
June 18, 10 a. m.	1095	1345	1273	1335	2513	3000	
	1540	1640	1870	1750	3050	3375	
	2605	2885	3143	3085	5563	6375	

Relative Conducting Power for Heat Calculated from above Data.

Silicate cotton.....	100	Wood shavings.....	125
Hair felt.....	117	Gas-works breeze.....	230
Charcoal.....	130	Wood and air space.....	280

No observations were taken until the vessels charged with ice had been about 18 hours in the constant temperature of the room, thus allowing equilibrium to be established. The melted ice was then carefully drawn off from the solid ice by an india-rubber pipe, provided with a clip, at 10 a. m. of June 15, and the results during the subsequent 24 hours were taken as the most reliable, although for a still further period of 48 hours the observations were continued, and are recorded in the table. All the materials were dried by keeping them in a loose state in a well-ventilated room, kept warm by an ordinary domestic fire for several weeks before the commencement of the experiments. It was now thought desirable to make a similar series of experiments in a room kept at a temperature of about 100° F. These were commenced on January 17, 1884, and continued until the 19th, and the results are recorded in Table II herewith. The

an equilateral triangle. The altitude of the triangle may be calculated by the familiar rule of the reverse of the hypotenuse. It will be found equal to nearly 90 feet. The result, though deduced by the simplest of calculations, is an astonishing one. It is enough to account for any number of "sun kinks." The books are very prolific of instances of expansion by heat, and always speak of the expansion of rails. They do not, however, allude to the geometrical element of danger; they concern themselves only with the physical one.

It is obvious that a mile of rails would never expand in this way. Disturbances of alignment would be confined to smaller sections. The calculation shows a maximum that would never be attained. The conditions might be fulfilled by four rails. For the given elevation of temperature they would expand about 1½ inch, with a lateral displacement of over 2 feet. For an ex-

TABLE II.—EXPERIMENTS COMMENCED JANUARY 17, 1884—10.15 P. M.  
Ice Melted with Different Insulators Measured in Cubic Centimeters.

Date.	Sil. cotton. Cub. cent. ice melted.	Cotton. Cub. cent. ice melted.	Wool. Cub. cent. ice melted.	Infus. earth. Cub. cent. ice melted.	Charcoal. Cub. cent. ice melted.	Sawdust. Cub. cent. ice melted.
Jan. 18, 8 a. m. to 11 a. m.	225	Deg. 97	232	Deg. 97	345	Deg. 98
Jan. 18, 2 p. m.	360	100	355	99	340	99
Jan. 18, 5 p. m.	275	101	353	101	430	100
Jan. 18, 8.30 p. m.	85	96	105	95	175	95
Total.....	945	1097	1290	1285	1510	1540

Relative Conducting Power for Heat Calculated from Above Data.

Silicate cotton.....	100	Infusorial earth.....	136
Cotton wool.....	112	Charcoal.....	169
Sheep's wool.....	136	Sawdust.....	163

Or the Above Results Combined with those in Table I.

Silicate cotton.....	100	Charcoal.....	140
Hair felt.....	117	Sawdust.....	163
Cotton wool.....	128	Gas-works breeze.....	280
Sheep's wool.....	136	Wood and air space.....	280
Infusorial earth.....	136		

water drawn off during the first 10 hours is not included in the table, which is confined to the results obtained between 11 a. m. of the 18th and 6.30 p. m. of the same day. Silicate cotton stands again at the head of the list, and it may be as well to explain that this interesting substance resembles cotton wool in appearance, and is produced in large quantities by blowing steam into melted blast-furnace slag. It is, therefore, a glassy fiber.

As it was an interesting matter to compare sheep's wool and cotton wool accurately, care was taken that the weight of material used in each case was exactly the same for a given space filled up, 3 pounds. The figures of conductivity obtained represent the warmth of garments of equal thickness and equal weights. Of course, if with the two materials the weight of the garment per square foot is identical, but the thickness different from a different style of manufacture, then these figures will be modified. As for technical purposes, charcoal is confined between walls of wood. A larger experiment was made in the room kept at 100°, the inner vessel of ice measuring 22 inches

pansion through 50° F., the displacement would be 18 inches. Two rails would act in accordance with the supposition most readily. Their total expansion for 100° F is 1½ inch, and the bulge due to such expansion would be 12 inches. For half the number of degrees it would be 9 inches. This shows how very small a rise of temperature might produce a spreading sufficient to throw a train from the track. The smaller figures are as impressive as the 90 feet, when it is recollected that 4 inches displacement of the rails might produce a catastrophe. The distortion might be confined to a single rail; and, from what has been said, it is clear how seriously the small fraction of an inch expansion could affect it. It is an application of the old law of the elbow-joint press reversed, the working pressure taking the place of the resistance. The work is done at a great disadvantage, but the power is almost limitless.

A very good instance of "sun kink" could be seen some years ago on the wooden bridge leading from the elevated railroad station at 155th street, in New York City, toward Ninth avenue. A gas-pipe of

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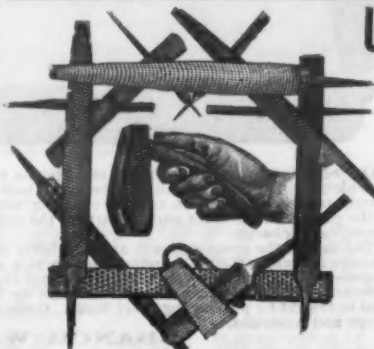


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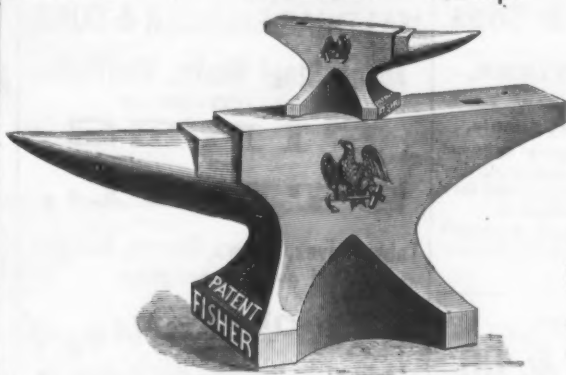
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wrought iron was laid on the floor of the structure. As if to render it more susceptible to the rays of the sun, it was painted of dark color. On cold or cloudy days it lay in its normal position. On sunny days the writer has frequently seen it bowed outward nearly or quite a foot out of line. The surface of the foot-planks under this part of it became worn by the daily friction. Finally, an arrangement of bends was introduced that operated as an expansion-joint, and now no bowing takes place. Even 50° F. seems a large rise in temperature. But it must be remembered that the temperature of rails or similar objects is affected by the radiant heat of the sun as well as by the atmospheric temperature. The latter is only their initial factor. The sun's rays could easily raise their absolute temperature above 100° F.

#### The Substitution of Steel for Iron.

(Concluded from page 5, October 2.)

II.—CIVIL PURPOSES.

The use of steel for bridges, buildings, &c., has not yet become general; no examples are known of its being applied to public buildings or private houses. The earliest application to bridge-building was in the construction of the Vienna bridge over the Danube, in 1828, built by M. von Mittis. This was a suspension bridge, the chains consisting of bars of steel, 61.5 x 19 mm. in section. The chainwork was made too light, being only one-fifth of the weight of the platform. Hence the bridge oscillated considerably. Several other smaller bridges, all very light, were also built across the Danube. The metal employed in all was hard steel. In 1862 the French engineer, Oudry, designed a bridge of Bessemer steel to join Sicily and Calabria. In 1863 steel began to be used in Holland for bridges for the State railways, at Limburg, near Maastricht. They were three in number, and were built by Sterckman & Son, of La Haye. They were lattice-girder bridges, 30 m. long by 4.50 m. wide. The weight of steel in beams and cross-ties was 20 tons, and the resistance of the steel plate 64 kg. per sq. mm., or 39.7 tons per square inch. In England, in 1864, Worthington built a swing railway bridge over the Sankey Canal. It had four girders of Bessemer steel, 55 feet 9 inches by 2 feet 3 inches deep, the span varying from 30 to 40 feet. It was built by Hick & Son, of Bolton, and was tested by a weight of 3 tons per square inch. With this the maximum deflection was 1 inch, and the permanent set zero.

In 1865 a bridge, 42 m. span, of puddled steel was built across the Gotha. In 1867 a bridge was shown at the exhibition at Paris, built by Joret, of Terre Noire Bessemer steel. It stood a stationary test of 500 kg. per sq. m., and a moving one of two trucks of 11 tons each. In 1869 this bridge was placed at Porte des Roches. In 1868 the same house built a similar bridge for Monte Video. In 1880 a steel bridge, with steel rivets, was built on the Missouri for the Chicago and Alton Railway. In 1880 also was built the largest rigid steel bridge in existence, over the Mississippi at St. Louis. This has three arches, the center one of 515 feet 6 inches, the others 495 feet. The height above water is 70½ feet. The limit of elasticity in the steel is 16½ tons per square inch, and it did not break at 41 tons. In 1881 the London and Northwestern Railway Company built a steel bridge at Llandulas, North Wales, with a length of 222 feet. It was very rapidly built to replace another without delaying train service. The materials were made in the company's works at Crewe in seven days, and in seven more the bridge was built. In 1883 the Brooklyn (N. Y.) suspension bridge was opened. It has a span of 1600 feet. There are four cables, each of 5000 steel wires of ¼-inch diameter. The platform is of steel. The weight of the central gallery is 6740 tons, and that of the cables is 2160 tons.

The disadvantages of hard steel are the following: 1, more care is required in working; 2, more labor is needed in the workshop; 3, there is danger of the bridge being too light. Steel is specially suitable for swing bridges, &c., where lightness is indispensable. In the bridges recently built of steel by the Creuzot Works the quality of metal employed is as follows: Limit of elasticity, 25 kg. per sq. mm. (15.5 tons per square inch); resistance, 50 kg. per sq. mm. (31 tons per square inch); elongation, 20 per cent. on a test-piece of 100 mm. (4 inches), equivalent to 16 per cent. on an ordinary test-piece of 8 inches. Steel manufacture is undergoing a change by the perfection to which Messrs. Thomas and Gilchrist have brought their process of making Bessemer steel from phosphoric ores. In Germany especially, castings have been made very rich in phosphorus. One house at Jœuf, near Longwy—that of Messrs. Wendel—has recently sold to the Eastern Railway Company 200,000 tons of rails of this metal, inappropriately called dephosphorized steel. It has this peculiarity that, while semi-hard and taking temper well, it contains very little carbon—2 per cent. only. Steel for flowing and cross girders has not yet come into use to a large extent. It is still more expensive than iron, and besides would be more flexible. Nevertheless, as the price is reduced, steel must come into use for these purposes.

#### III.—PARTS OF MACHINES.

Steel was first used in marine engines for crank-shafts in 1865, but unsuccessfully. A second trial in 1875 succeeded better, on the Caspian's shaft. Messrs. Vickers & Co., leading English makers, on December 31, 1881, had made 215 shafts of all sizes. That for the Alaska weighed 25 tons. Such shafts have been used by the Admiralty, by the Cunard, Inman, White Star, Allan, Guion, Orient and P. and O. lines, &c. At Creuzot, from 1869 to 30th of April, 1883, 4145 tons were forged in steel for naval purposes, but in the first five of these years only 55 tons were so forged. In 1874-75, the annual production rose from 102 to 750 tons. The French navy have generally adopted steel screw-shafts for the last 8 or 10 years. In Germany, Krupp, of Essen, produces large quantities of straight and crank shafts for various customers.

Quality and Condition of Using.—The metal must be of the greatest possible resistance, owing to the great strains to which the shafts are subject. On the Vickers system they are built of three and sometimes five pieces of Siemens metal, giving a resistance of 25 tons per square inch. The Bolton Iron and Steel Company use Bessemer or Siemens-Martin steel of less soft quality, and with a resistance of 28 to 30 tons. Sir Joseph Whitworth, again, prefers harder steel, giving a resistance of 37 tons per square inch. Messrs. Jessop & Son use steel from Swedish iron, with a resistance of 23½ to 27 tons. The steel preferred by Messrs. Spencer & Son has a resistance of 23 tons only. The Steel Company of Scotland use the Terre Noire process, and prefer a resistance of 27 to 29 tons. The French navy requires shafts of a style similar to the Vickers.

The following figures give some idea of what may be achieved by thoroughly good steel shafts. Table of miles traveled by four Vickers screw-shafts in voyages to and from New York:

	H. P.	Voyages.	Miles.
Britannic.....	5,000	22	136,400
Germanic.....	5,000	22	136,400
Adriatic.....	3,500	9	55,800
Celtic.....	3,500	5½	34,100

All these screw-shafts are still sound.

Table of revolutions and miles of four Krupp screw-shafts:

	Years' service.	Million revolutions.	Miles.
Vandalia.....	9	112	345,500
Servia.....	5	77	260,100
Frisia.....	5	67	262,000
Cimbria.....	7	49	168,050

The disadvantages of steel shafts are usually summed up as follows: 1, Cost. 2, Danger of sudden breakage. The greater first cost is compensated by greater durability, and this disadvantage is only apparent. The loss resulting when a vessel is laid up for repairs to a shaft far outweighs any original saving in price. The second evil is disappearing rapidly of late years through improvements in manufacture. At present crank-shafts are of two kinds, according as they are made (a) of wrought steel and (b) of cast steel. The former, if large, are not found to be sufficiently homogeneous. The latter have the same fault, and are not soft or ductile enough for such a purpose. Perfect homogeneity is necessary, as any want of it is a most serious fault.

It would be better to have a moderate material, which was perfectly uniform throughout, than a much better material, inside which there was a want of homogeneity, and in which the molecules were under severe strain. In iron, where the metal occurs in layers more or less welded together by cinder, there is no such thing as homogeneity, but at the same time there is no fear of sudden rupture, for an abnormal condition between the molecules, which causes such ruptures, cannot exist in iron where they are separated from one another. It is to be regarded as a bundle of rods rather than as one solid piece. In steel the case is otherwise. The chief causes of want of homogeneity, especially in large pieces, are the molecular tensions, produced first in cooling the ingot, and afterward in the various reheating operations. There are great differences between the temperatures outside and inside the hot mass, and this in cooling produces abnormal tensions, which it is very difficult subsequently to remove. Forging has indeed this effect, so long as the pieces do not exceed a certain size; but in shafts larger than 10 inches it is impossible to make the heating and cooling go on uniformly, and in spite of the use of enormous hammers, such as those at Creuzot, &c., it is not probable that the inside of the piece can be rendered perfectly homogeneous and free from strain.


To get over this difficulty the author proposes to hollow the shafts after forging by boring them out of the solid, the internal diameter being about one-half of the external. These hollow shafts should afterward be annealed, and the cranks may either be forged on to them or fastened by bolts like the "built-up" shafts used in England. This system should not increase the cost of the shafts, since the cylinder taken out from the interior ought to compensate for the expense of boring. The hollow shaft will not weigh more than three-quarters of the solid shaft, and in addition to the saving in dead weight the inertia of the moving parts will be less, and there will be less danger of fracture in case of accident or sudden stopping. The special advantage, however, is that they would insure the metal being homogeneous. No such accident could occur as that which happened to the screw-shaft of the Faraday. This broke after some months of service, and yet showed no flaw in the fracture, while the metal, as proved by tests, was both strong and ductile. The fracture can only be attributed to want of homogeneity in the parts. It cannot be due to the metal being somewhat hard, inasmuch as the shafts made by Krupp are still harder than that of the Faraday, and yet are of excellent quality. The reason, no doubt, is that these are made from the crucible, and thus perfect homogeneity is insured. On the whole, the conclusion is that the quality of such shafts should approximate to that of the steel used for guns, but should be somewhat milder, having a resistance of about 30 tons per square inch. Steel shafts should not be made of less diameter than iron ones, in order that they may retain ample surface in the bearing for the diminution of friction.

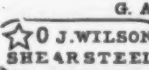

Locomotive and Wagon Axles.—Only a few words need be said on this subject. The crank-axes of locomotives are now made almost entirely of steel. They are much superior to those of iron, and in spite of their high price are more economical, from their far greater durability. The mean mileage run with a steel axle may be taken at 180,000 miles, while that of an iron axle cannot be taken at more than 20,000 to 30,000 miles. Of 40 crank-axes furnished by Krupp for the Western Railway of France, between 1860 and 1868, 24 are still in use, having run on an average nearly 300,000 miles. Wagon and carriage axles are still made in many cases of iron, but the superiority of steel is now incontestable, and their price is no higher. Many companies, such as the Western of France, have entirely renounced the use of iron.

#### IV.—STEAM BOILERS OF STEEL.

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NOW, This, is to Witness, that, in consideration of the forbearance of the Representatives of the said John Wilson to sue me for damages for the wrong aforesaid, I do hereby undertake and agree,  
FIRST, to surrender and deliver to the Attorneys for the said John Wilson, all knives now on hand, and in my possession, or under my control, bearing the said imitation trade-mark, and  
SECOND, I further undertake and agree to and with the said John Wilson, and his legal representatives, not to manufacture or sell, or cause to be manufactured or sold, at any time in the future, Knives or other Cutlery, bearing his trade-mark aforesaid, or any imitation or simulation thereof. IN WITNESS WHEREOF, I have hereunto set my hand and seal at West Mansfield, aforesaid, this thirty-first day of May, 1883.  
  
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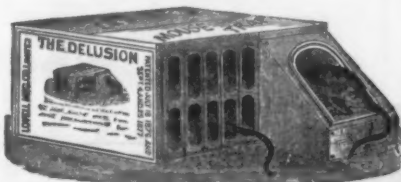
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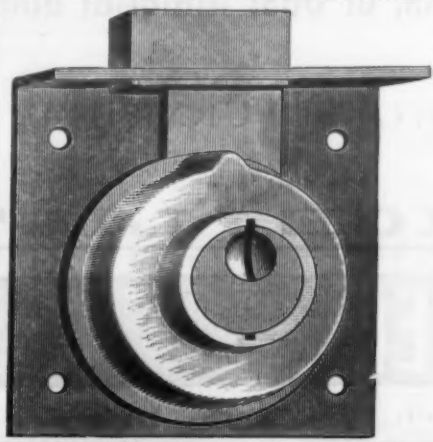
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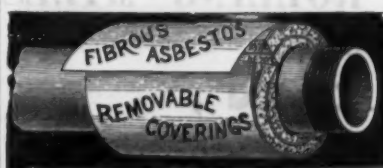
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reduction of one-third the thickness, as compared with iron, was at once allowed. Again, in 1861 a reduction of one-half the thickness was allowed by a ministerial circular in the construction of boilers of steel, providing a resistance of at least 60 kg. (37 tons) was obtained. The boilers of the iron-clads Provence, Revanche and Savoie were made of steel between 1861 and 1864. In 1862 15 locomotives for the Midi Railway were made with steel boilers, the metal being crucible steel by Petin and Gaudet, having a resistance of about 36 tons and 17 to 19 per cent. elongation.

In 1863 the Orleans Company obtained from the same firm some steel plates with a resistance varying between 38 and 45 tons, and an elongation varying between 10 and 7 per cent. The thickness of the plates in these boilers was reduced from 1 1/4 to 8 mm. A less resistance was, however, soon preferred, and in 1869 the Orleans Company placed the limits between 32 and 38 tons, with an elongation of from 12 to 22 per cent. In 1871, after the German war, great exertions were made in the renewal of rolling stock, &c., and some of the steel used, from want of homogeneity, failed in practice. The boilers of three frigates made of steel had to be very shortly replaced by iron. A locomotive burst on the Midi Railway, and another on the Orleans Railway. In spite of this the advantage of steel was recognized, not only for hulls of ships, but also for their boilers, as far, at least, as regards the shells. The flues, in which most of the accidents had occurred, are still made of iron in the French navy.

In England, however, the use of steel as a material for complete boilers has received a large extension. It was stated at the meeting of the Iron and Steel Institute at Paris, in 1878, that in England there were 4000 boilers, for the construction of which 14,000 tons of steel were used; 1000 of these belonged to the North Western Railway Company. In April, 1881, Mr. Parker estimated the number of steel boilers on board English ships at 1100, weighing 17,000 tons. In 1883 he also said there were six times as many steel boilers as iron in existence in the English marine. In the French navy steel is now universally employed, and the Creusot factory has turned out about 350 tons of steel plates yearly for the navy during the last six years. On the other hand, the French merchant marine has not yet followed their example.

The boilers built before 1875 failed from the heterogeneity of the metal. The steel, being hard, suffered considerably in punching and riveting. Corrosion—attributed by Siemens to presence of manganese—is considered by the author to arise mainly when slight flaws or cracks are present, arising either in manufacture or in service, and to be less important the milder the quality of the steel.

Quality, &c.—As to this, it is sufficient to cite the present requirements of the French navy, which as under for cold tests:

Plates.	Resistance.	Elongation.
34 to 32 inches thick...	36 tons	24 per cent.
32 " 30 " " " " "	36 " "	26 " "
30 " 1.50 " " " " "	25 " "	25 " "

The hot tests are the same as for shipbuilding. Under the press the plates should bend double without showing traces of rupture. The thickness of a steel plate is estimated in the same way as an iron one, taking into account the difference between the metals in resistance. At present a reduction of 20 to 25 per cent. is allowed in France, the last figure being that permitted by Lloyd's rules in England. As to the working of boiler plates, they should be worked in the same way as plates for ships' hulls. All rivet holes should be drilled, not punched.

In conclusion, the author cites the report of the jury at the exposition of 1878, which may be summed up as follows: The accidents which have occurred with steel boilers are due to: 1. Insufficient malleability. 2. Irregularities in manufacture. 3. Defective methods of working. The first two causes have now disappeared, and the third is rapidly disappearing.

## Ventilation of Coal Cargoes.

In late years the question of how to properly ventilate coal cargoes and avoid, as far as possible, the disastrous consequences of spontaneous combustion has received a good deal of attention, and the crude ideas formerly entertained in regard to this matter are being rapidly crowded out of existence. Some nine months ago we referred to the fact that the methods generally adopted were almost the reverse of what they should be, and that forcing currents of air through a cargo could never be expected to secure freedom from danger. It may be interesting in this connection to direct attention to the recent report submitted to the Committee of Lloyds (England) by the British Board of Trade concerning the surface ventilation of a cargo of 2050 tons of coal carried in the vessel Sutherlandshire, while making the voyage from Hull, England, to San Francisco, in 1883. Large vessels bound for San Francisco have to encounter elevated temperatures, and at the same time the coal, as in this case, is generally in great mass, and the liability to accident is thus much greater than in vessels carrying smaller quantities and for shorter distances. Any successful precautionary measures adopted are consequently entitled to special attention. From the above-quoted report it appears that great advantages were gained from following out a certain system of tubes inserted at different points in the cargo, thus enabling a ready determination of the temperature in the interior of the coal mass. The tube system was carried out under instructions given in the report of the British Royal Commission appointed several years ago to inquire into the causes leading to the spontaneous combustion of coal while in transit in ships, and has apparently given very satisfactory results.

It is stated that while the Sutherlandshire was at San Francisco three coal-laden vessels arrived on fire, and that one of them—an American ship—had been on fire 53 days. When detained the Sutherlandshire was fitted with a box ventilator on each hatch—viz., fore, main and aft—passing down through the body of the cargo. There was also one 14-inch cowl ventilator passing

through the forecabin and main decks; one trunk ventilator, with skylight top, leading through midship house and main deck; one 18-inch cowl, abaft mainmast, leading to the water tanks, and two 12-inch cowls through poop and main decks to storeroom right aft. The alterations made were as follows: The two aft ventilators were boxed and continued through the storeroom deck to the cargo. The tank ventilator was opened out to the cargo at the main deck, and the trunk and forecabin ventilators were accepted, being suitable for surface ventilation. The three wood-box ventilators in the hatchways were removed and testing-pipes put in their places.

## The British India Wheat Crop.

The British Indian Agricultural Department, in answer to a resolution of the Indian Government of the 10th of March, has made its report, which is summarized as follows: The total wheat area in British India is about 26,000,000 acres. The total yield in a fairly good year is put at 252,000,000 bushels, giving an average output of 9 1/2 bushels per acre. In the Punjab, on the whole, the yield in 1884 was above an average. The average area under wheat is 7,000,000 acres, and the average yield 74,400,000 bushels. The yield for 1884 is placed at 80,000,000 bushels. In the North-western Provinces and Oude the area under wheat was a full average. The yield, however, was in many districts short, owing to the deficiency in the fall and winter rains. The area of this division is 6,200,000 acres, with an output in 1884 estimated at 60,000,000 bushels. The area under wheat in the Presidency of Bombay in 1884 was up to average, except in Scinde, where it was an average yield. The ordinary usual area under wheat in the Presidency is 1,600,000 acres, and on this basis the probable yield is 16,000,000 bushels. In the Central Provinces the harvest was excellent, the output being fully 15 per cent. above average. The average area is placed at 4,000,000 acres, but the yield is ordinarily less than in Northern India. The estimated yield of 1884 is about 40,000,000 bushels. The summary of the foregoing is as follows:

Presidencies.	Acres under wheat.	Yield—total bushels.
Punjab.....	7,000,000	80,000,000
Northwest Provinces.....	6,200,000	60,000,000
Bombay.....	1,600,000	16,000,000
Central Provinces.....	4,000,000	40,000,000
Native States .....	4,000,000	40,000,000
Total.....	22,800,000	244,000,000

The acreage, as last above stated, is 3,200,000 acres less than first stated. There may be some other Indian States not included in the foregoing. The crop in the Native States is estimated, and the estimate is not based on actual returns. It is inferred that with a good rainy season following an average wheat crop, so as to secure the autumn harvest, one-fifth of the wheat crop will be available for export. Still, the export in the last few years, taking the aggregate crop, has not been 7 per cent. of the crop.

## The Mexican Postal Treaty.

Advices from Washington are to the effect that all the details of the postal treaty with Mexico have now been practically agreed upon, and one of the first acts of the new Postmaster-General will be to sign the document. The leading features of the treaty, so far as they affect correspondence from the United States to Mexico, may be briefly summarized as applying our domestic rates of postage to all correspondence, prepayment in full to be compulsory. The main point of difference between the two countries, which has protracted the negotiations so long, was the desire of the Mexican Government to secure free transportation over the railroads of the United States for Mexican mail for other countries. This country was not willing to yield this point, because it would necessitate a similar concession to Canada, and would then cost the United States a sum nearly equal to that now paid to us by Great Britain for the transportation of her Australian mails across the continent, which amounted in 1882 to more than \$115,000. The point was made by the United States that, while the provision upon which Mexico insisted would be to the temporary advantage of that country, it would in the end prove to be a serious embarrassment. It was represented that, with the extension of railroad connections to unite the future railroad systems of the South American Continent with those of North America, all the mail from South America for the United States and Canada, and nearly all of the mail from there for the rest of the world, would pass through Mexico and over Mexican railways, and if Mexico were now to insist upon the free transportation through the United States of her mail for other countries, and this country were to yield, then by considerations of comity Mexico would hereafter be compelled to make a similar concession to the Empire of Brazil and to the South American Republics for the free transit over her railroads of their mail for other countries. This argument convinced the Mexican Minister that it was unwise to insist upon the point in controversy, and upon his representation of the facts the Mexican Government has yielded the point, and the treaty will go into operation as soon as it has been signed by the Postmaster-General and ratified by the Mexican Senate. There is no doubt of its ratification by Mexico and in the United States. A postal treaty does not need to be ratified by the Senate, but is completed by the signature of the Postmaster-General and the approval of the President.

Some branches of trade continue profitable, notwithstanding the dullness of general trade. The annual report of Warden Green, just submitted to the Commissioners of Charities and Correction, shows that during the past year the Kings County Penitentiary, New York, made a profit of \$17,704.42. The receipts from all sources were \$91,704.42, which is the largest yearly amount ever received in the history of the institution. From convict labor the receipts were \$7000 in excess of last year.

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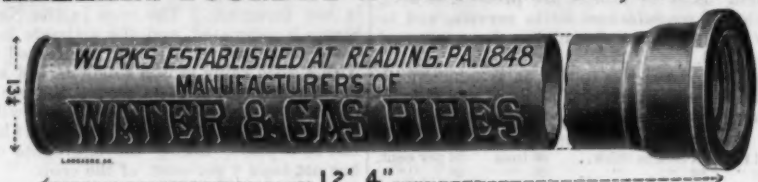
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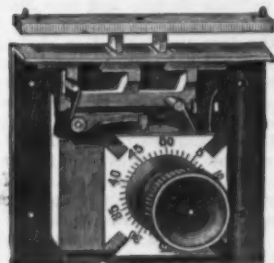
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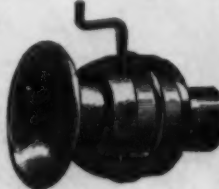
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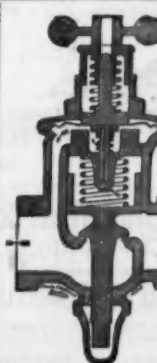
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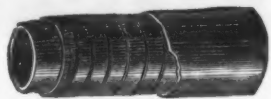
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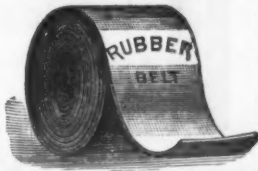
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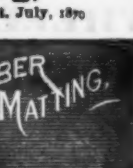
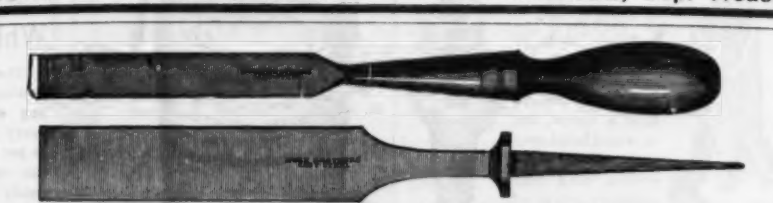
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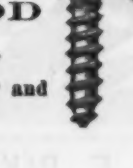
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BY OBERLIN SMITH.

The object of this paper is to briefly call  
attention to the loose system, or rather en-  
tire lack of system, prevailing in our draft-  
ing-rooms and machine shops, in writing and  
speaking of the relative locations of the  
various parts of machinery.In designing and building a new machine,  
especially if of a new type, numerous verbal  
explanations are necessary—from de-  
signer to draftsman, and from either or  
both to pattern-makers, machinists and  
other artisans. These may be written or  
oral, but are usually both. They should,  
however, in all cases be of such a character  
as to be clearly expressed in words alone,  
without the need of arbitrary signs in writ-  
ing or gestures in speaking. Thus, in these  
days, when time is so valuable a commodity,  
especially with the higher grades of work-  
ers, much of it may be saved if a designer  
can verbally express his ideas without  
ambiguity—perhaps through a stenographer for  
record, perhaps through a telephone to a  
distant assistant.To carry out this matter to an ideal state  
of perfection would involve a reform in  
mechanical nomenclature and the coining of  
a number of new words, together with the  
establishment of a system by which any part  
of a machine could be definitely located and  
its entire construction described in a table of  
words and figures, without the use of any  
drawings at all. Such a scheme is briefly  
outlined further on, and its partial applica-  
tion to actual work, but a more important  
purpose of this paper is to urge a reform in the  
use of a few words pertaining to location  
and motion which are commonly employed  
by draftsmen and machinists in a very  
ambiguous way.An instance of this is where some point on  
a drawing is spoken of as to the right or left  
of some other given point or line, because it  
appears so upon a side view, while, in the  
machine itself, it is really backward or for-  
ward of the given point or line. Another  
instance is where some member of a machine  
is supposed to have considerable individuality  
of its own and has some important side,  
which its chiseler chooses to call its front,  
facing in a different direction from the main  
front of the machine itself. This is the case  
in an ordinary lathe, where the main front  
is toward the operator and where the front  
side of the bed or of the carriage, or the  
front end of the cross-slide screw, are very  
properly spoken of, yet where the terms  
"front" and "back" spindles mean, ab-  
surdly enough, the left and right spindles  
respectively. Again, the right end of the  
live spindle is usually called its front end,  
while the same term "front" is applied to  
the left end of the dead spindle. Numerous  
other cases might be mentioned that are not  
less foolish and are even more liable to cause  
mistakes, but these will suffice as examples.The writer, in his own practice, has found  
the remedy for these evils simple enough by  
merely establishing the following positive  
rules: 1. Every machine must have some  
one side assumed as its front, and another  
side at right angles to this and the one that  
is usually beneath, assumed as its bottom.  
Opposite to these respectively are, of course,  
the back and the top, while the right and  
left are at the right and left of a person  
standing in front of the machine and facing  
toward it. This applies to stationary ma-  
chines, and the side assumed as the front  
should usually be that toward which the  
operator is habitually placed. 2. In the case  
of traveling machines, such as boats, loco-  
motives, reapers and other vehicles, the end  
that goes forward must, of course, be called  
the front. As the operator is upon such a  
machine (instead of outside of it) and with  
his face forward, the right and left sides are  
reversed in relation to the front and back.  
This would seem to break up the unity of  
the system, but it need occasion no practical  
inconvenience if the names of the different  
sides are definitely fixed upon and distinctly  
marked upon all the views in the drawings.  
3. In stating the location of any part in re-  
lation to some other part, or to a main center  
line or reference plane, the only terms to be  
used are these six: "Front of," "back of,"  
"right of," "left of," "above," "below."  
If the point to be located is in a diagonal  
direction from its reference point, its place  
is usually defined by two or more of these  
rectangular measurements, and not by its  
diagonal distance. In some cases, however,  
it is more convenient to give its actual di-  
agonal distance and otherwise define its position  
by angular measurement from a rectangular  
line drawn through the reference point.  
Thus, the back gearing spindle or "quill"  
of an engine lathe might be located as so  
many inches from spindle axis and so  
many degrees above back, instead of giving  
the number of inches back and up. The  
former way is here better (as it is in  
most cases of geared shafts), because the  
actual distance is a definite one, being the  
sum of the radii of two pitch circles. Of  
course these shafts can be located by their  
axes alone, as can all cylindrical, conical  
and other round bodies or spaces.The writer has found this accurate use of  
terms of great advantage in explaining new  
work to his assistants, and has, on a quite  
recent occasion, been enabled thereby to  
have them hurry to completion an intricate  
machine, the design of which he was obliged  
to leave unfinished when starting away for a  
somewhat prolonged absence. The necessary  
explanations were sent partly by letter and  
partly by telephone, and, although the  
phraseology used, with its frequent "ups,"  
"backs" and "lefts," might not have been  
the most poetically flowing English, it had  
the merit of meaning exactly what it meant,  
and nothing else.The ideal system before referred to is in  
the same line of thought, but goes much  
further. The idea is to locate any desired  
number of points in a given machine upon  
the same general principle as positions are  
fixed upon the earth's surface by latitude  
and longitude, but the directions of measure-  
ment would be at right angles to each other  
and would be three in number—that is,  
until such time as Section D of the AmericanAssociation shall have reached a state of  
development in pure mathematics which  
will justify it in calling for measurements in  
a "dream space," as Professor Proctor has  
aptly called it, of more than this number of  
dimensions.In this system all measurements would be  
taken perpendicularly from three imaginary  
"reference planes," which would preferably,  
in most cases, be exterior to the machine and  
would, of course, be the three adjacent sides  
of an inclosing cube. They could be in any  
desired position, but would perhaps be as  
convenient as any way if placed at the bot-  
tom, left and back. In such cases all mea-  
surements would be either "up," "right" or  
"forward," and could be conveniently ab-  
breviated as "U," "R" and "F," respec-  
tively. Thus it is obvious that any desired  
number of points upon the surface of any  
member of a machine (or, for that matter,  
any other object) might be successively  
located simply by a line or column of figures  
representing inches or some other uniform  
unit of measurement, each prefixed by one  
of the three letters mentioned above. To  
avoid writing the letter each time, it (or the  
word for which it stood) might be placed at  
the top of a column in which all the figures  
relating to that "dimension" might be  
written. Matters could be still more sim-  
plified by taking a set of horizontal mea-  
surements, all at one given height, which might  
be expressed once for all at the top of the col-  
umn. After these were taken another set  
could be made in a horizontal plane at a dis-  
tance above the last one which represented  
the degree of delicacy required. For de-  
fining the shape of a cast-iron frame of a  
medium-sized machine, for instance, a set of  
measurements at each inch in its height  
would usually be sufficient.The method above outlined would, if fol-  
lowed out strictly, require a ridiculous num-  
ber of unnecessary measurements if such  
objects as shafts, pulleys, cog-wheels, &c.,  
were to be defined by points upon their  
surfaces. Happily, however, the matter  
could be enormously simplified by locating  
such members of a machine by their axes  
and one of their ends only. Such a system  
would be of extended practical use only by  
having a machine made up of as many  
standard shapes as possible, each of which  
could be individually located in a very few  
measurements, perhaps in some cases angu-  
lar, instead of linear.A modification of the proposed exterior re-  
ference planes would sometimes be desirable  
by making two or more of the planes inter-  
sect, and one or more of them to lie in some  
main axis or center line of the machine.  
This would most likely be the case where  
symmetry of design would allow a set of  
measurements to be repeated in an opposite  
direction. If these were given in detail it  
would be necessary to use the words  
"down," "left" and "back," as well as  
"up," "right" and "forward." These could  
be expressed as "D," "L" and "B,"  
respectively, unless it should prove better to  
use only the first given set of letters and put  
minus signs in front of them when reverse  
directions were to be given.This topographical system, so to speak, has  
not yet been worked out by the writer to the  
stage that fits it for shop practice, but he is  
studying upon the subject as he has leisure,  
and hopes at some future time to get it into  
shape. As outlined above it is in a very  
crude condition, but the principle is capable  
of wide application in practical engineering,  
as combined with a system of drawings, if  
not actually supplanting them. The writer  
has frequently found it very useful in "fig-  
uring up" rough sketches and memoranda  
of an existing machine which it was desir-  
able to add to, alter or produce, and of  
which drawings had to be made. In such  
a case the floor answered as one of the  
reference planes, while a side and rear wall—  
or, in lieu thereof, a pair of large drawing-  
boards, fastened in a vertical position at  
right angles to the floor and to each other—  
answered as the other two planes. For taking  
the measurements a large "surface gauge"  
or "scribe-block," together with a gradu-  
ated scale of some sort, fastened, for the  
time being, perpendicular to the plane from  
which the distances are being taken, are very  
convenient tools.This definite locating of all important  
parts from common starting places, and  
independently of each other, will be found  
vastly more accurate and complete than  
the method used by many draftsmen where  
a lot of measurements are taken at random,  
from some place to any place, and where  
one is apt to find afterward, when too late  
for remedy, that some "key-note" in the  
survey has been left out entirely.In plotting down such a survey as has just  
been referred to it will be found of great  
benefit to use cross-ruled drawing paper,  
preferably graduated to inches and their  
halves, quarters and eighths, the inch lines  
being the heaviest. These lines should be  
numbered from one edge of the paper each  
way, and their use is just as important as  
are the lines of latitude and longitude in  
copying a map drawing.In conclusion, the writer would say that  
no new principles are here claimed, but  
merely the application of some very old  
ones, and as yet in a somewhat imperfect  
way, to the ordinary operations of machine-  
shop practice. Such a reform as is herein  
foreshadowed is most urgently needed as one  
of the means of systematizing the work of  
the mechanical engineer. It is, in fact, only  
the common-sense use of methods which  
have long been employed by the geographer,  
the topographical engineer, and even by the  
landscape gardener and the railway con-  
tractor.**Annual Meeting of the Pennsylvania  
Steel Company.**—The Pennsylvania Steel  
Company held an annual meeting on the 1st  
inst., in their office, 208 South Fourth street,  
Philadelphia, and elected the present officers  
and directors for the ensuing year, as follows:  
President, S. M. Felton; secretary and treas-  
urer, E. F. Barker; superintendent, Luther  
S. Bent; directors—Samuel M. Felton, Ed-  
mund Smith, William Matthews, H. H.  
Houston, Charlemagne Tower, William W.  
Spackman and Francis Thompson, of Boston.  
After the meeting a prominent officer of the  
company said the outlook of the steel trade  
in Pennsylvania for the coming year is  
bright. The annual report shows that the\*A paper read before the American Association  
for the Advancement of Science, Section D, at  
Philadelphia, September 10, 1884.

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for Every  
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GUARANTEED TO GIVE  
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easily adjusted and operated. We also carry large stock  
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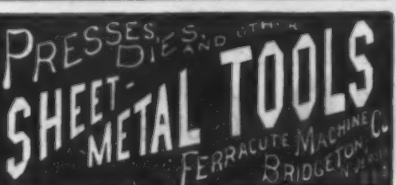
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The Largest Manufacturers and Dealers in Stones for

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ine.  
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**DURRIE & McCARTY,**

NEW YORK AGENTS.



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IMPROVED UNDER PATENTS OF 1875 AND 1876.

Safety Economy in Fuel, Low Cost of Maintenance Dry Steam without Superheating, Large Reserve Power  
ARE THE ADVANTAGES OFFERED BY THIS BOILER IN A PRE-EMINENT DEGREE.

3000 Horse-Power in Progress and for Immediate Delivery. Correspondence Solicited.

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## BELLAIRE NAIL WORKS,

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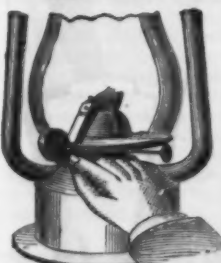


For Sale by all the principal Hardware Dealers.  
Send for price list.

Malleable Iron Castings of superior quality  
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**HAMMER & CO.,**  
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### LANTERN.



Lantern Lighters,  
attached to perforated plate, fits all  
Tubular Lamps, makes all old styles  
better than any tilting or raised globe;  
will light in the wind; perfectly  
safe; no use for matches. Agents  
wanted everywhere. Money can be made  
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**WEATHER STRIPS.**

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AND  
FARM FEED  
MILLS.

Grinds wet,  
green, greasy or  
dry bones.  
Prices for Hand use, from \$4 to \$15. For Power use,  
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on application.  
**WILSON BROS., Easton, Pa., U. S. A.**  
A discount to the Trade only.



### NEW CHAMPION FORCE PUMP

Vacuum Chamber and Air Chamber,

Producing a continuous flow of water, both in suction and discharge. Works smoother and easier than any other force pump in the market. Has Seamless Drawn Brass Cylinders and no stuffing boxes. Never freezes in winter, and is not liable to get out of order. With Hose Attachment it is valuable as a fire protection, and for sprinkling lawns, gardens, &c. It is specially adapted for all kinds of wells—dug, drilled or driven—and for pumping water long distances from springs.

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With the Ratchet Stock pipe can be threaded in a corner, down in wells, or in positions that would be inaccessible with other tools.  
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MANUFACTURERS OF  
Porcelain, Mineral and Jet Knobs & Escutcheons.  
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past year was much better for the workmen than for the company. "We have had," he said, "plenty of orders, and have succeeded in keeping our workmen employed the year through. The prices received, however, were much lower than in former years, which materially lessened our profits. The demand for steel is now steadily on the increase, and we anticipate that the coming year will be a successful one, as far as work is concerned, although the stagnation of the money market will have the effect of keeping prices down."

### TRADE PUBLICATIONS.

#### The Frue Fanning Machine.

We have received an illustrated and descriptive pamphlet of the Frue fanning machine, made by Messrs. Fraser & Chalmers, Fulton and Union streets, Chicago, Ill., which contains an account of its invention and first introduction in some of the Western silver mines. The main advantage claimed for the fanner is in the treatment of a stamp-mill pump at one cheap operation, producing clean concentrations with but little loss of value. The cuts in the pamphlet illustrate the Frue fanning machine and the Embrey concentrator, each with two views, the latter machine being also made by the same company. An inclosed letter bears high testimony to the merits of the Frue fanner.

#### Horizontal Automatic Cut-Off Engines.

The new catalogue of the New York Safety Steam Power Company, of 30 Cortlandt street, which has just come to hand, gives a complete and interesting description of their horizontal automatic engines, with tables of sizes, speeds and powers, and much other information. Perspective and sectional views and plans and elevations are supplied, showing all the essential details, and enabling the reader to form a very good idea of the arrangements adopted. The company's horizontal engines have of late attracted some attention, and to those who are desirous of obtaining further particulars about them the catalogue may prove a very convenient source of information.

#### Mining Machinery and Steam Engines.

The M. C. Bullock Manufacturing Company, of Chicago, Ill., announce, in a recently-issued catalogue, that they have purchased the sole right to manufacture, sell and use throughout the United States (prior licenses excepted) all the patterns and styles of rock drills made under the original Lechot patents, and also a large number of patents granted to Mr. M. C. Bullock, which control some valuable improvements on diamond-pointed rock drills. The catalogue is very fully illustrated throughout, containing engravings of various rock drills, lifting jacks, steam pumps and hoisting engines, &c., together with detailed descriptions.

#### Special Machinery for Steam Users.

We are in receipt of a four-page pamphlet devoted to brief descriptions and to illustrations of the Korting double-tube injector, exhaust steam induction condenser, furnace blower for steam boilers, steam-jet chimney ventilators, and a number of other appliances for which Mr. A. Aller, of 109 Liberty street, New York, is the agent. The pamphlet, as may be expected, conveys only a very general idea of the arrangement and functions of the machinery referred to, and more specific information may be obtained by applying to Mr. Aller.

#### The Shipman Engine.

Mr. C. E. Little, 59 Fulton street, New York, has sent us an interesting little pamphlet devoted to the Shipman engine, for which he is agent. The engine, as we understand it, is built by Mr. G. H. Shipman, of Rochester, N. Y., and is described at some length in the pages now before us. It is adapted for the supply of small powers, and may possibly prove an object of interest to some of our readers.

#### Scales.

Riehl Bros., of Philadelphia, have issued a neat little catalogue giving full information concerning their standard scales and trucks. It is illustrated throughout, and, in addition to descriptive particulars, contains tables of dimensions, price lists and a telegraphic code for the convenience of customers in sending orders.

#### Engineers' Supplies.

We are in receipt of an interesting little trade catalogue brought out by a German firm, Messrs. Dreyer, Rosenkranz & Droop, of Hanover, and giving particulars and illustrations of their engineers' supplies. As a specimen of German enterprise in this direction it is certainly worth notice, showing, as it does, that the value of this method of bringing their goods to public notice is being appreciated by German manufacturers. The book is neatly arranged, very fully illustrated, and will favorably bear comparison with some of those brought out by American firms.

#### Power-Transmitting Machinery.

The Walker Manufacturing Company, of Cleveland, Ohio, have sent us two catalogues, one being essentially of a descriptive character, while the other contains detailed price lists of their different manufactures. Both will unquestionably prove welcome sources of information for the firm's customers.

#### The Baltimore Car Wheel Company.

The recently-issued catalogue of the Baltimore Car Wheel Company, of Baltimore, Md., is an unusually attractive specimen of its kind, both as regards appearance and arrangement. It embraces 58 pages, is handsomely bound and illustrated, and supplies a large amount of valuable information to purchasers of the company's manufactures.

#### The Cummer Engine.

A number of interesting pamphlets recently issued by the Cummer Engine Company, of Cleveland, Ohio, contain illustrations

and particulars of the now well-known Cummer engine, referring to its valve and governing arrangements, excellence of workmanship, simplicity of mechanism, &c. Engravings are also given of their independent air pump and condenser, and the Ballantine ice and refrigerating machine built by them.

#### Railway and Machinists' Tools and Supplies.

The new catalogue of Messrs. Manning, Maxwell & Moore, of 111 and 113 Liberty street, New York, issued a week or two since, is one of the most elaborate and carefully-prepared specimens of trade literature which we have seen for some time. Covering, as it does, an exceedingly wide range of subjects, the reader will find it to contain illustrations and descriptions of an almost endless variety of mechanical devices, and its value is thus restricted not merely to that of an advertising medium. The volume is 10 x 13 inches in size, embracing 660 pages and 2716 engravings. We have no doubt that its perusal will prove both interesting and valuable to all who will give it the necessary time and attention.

#### Sunk in a Caisson.

A singular accident, unusual in its character and remarkable in the escape of the actors from death, occurred at Havre de Grace, Md., on the 1st inst. The outer shell or coffer-dam of caisson No. 9, which is being sunk as the foundation for one of the piers of the new bridge of the Baltimore and Ohio Railroad Company, now in process of construction, spanning the Susquehanna River, gave way. The crib and air-lock shaft were flooded, and the working chamber rapidly filled. Most of the men got out safely before the accident occurred, but six men were imprisoned in the submarine chamber. The caisson is larger than any of the others sunk for the bridge. It is 60 feet long and 40 feet wide, and at the time of the accident the working chamber was 60 feet below the surface of the water. The entrance to the caisson proper is made through a perpendicular iron shaft about 3 feet in diameter, with foot and hand holes on either side. It is divided into locks, each lock having a gate. When the men descend, the lock tender withdraws the air and the gate falls, and the last man down lifts the gate. When the bottom gate is opened the air rushes in, thus holding the top gate in position. The same process is repeated until they reach the working chamber, which is lighted brilliantly by electricity. The air in the chamber, beyond being a little oppressive, is said to be not unpleasant. The work of excavating is being vigorously pushed night and day, on Sunday as well as week days. Each shift is allowed 20 men and a foreman.

The men were working under a pressure of 28 pounds at the time of the collapse, and when the lock flooded, the only entrance or exit to and from the caisson was cut off. The air apparatus, however, fortunately continued to work, and this was the men's only salvation. They remained in their prison helpless until rescued by the superintendent, John O'Brien, who conceived an ingenious plan and proceeded to put it into practice. The outer lock was 5 feet under water, and the next lock, which was 15 feet deep, was full of water. Mr. O'Brien made a coffer-dam of boards, and calked it tightly with oakum and cement. Then he bailed out the water, descended and raised the flooded lock and bailed that out. He then descended through his rudely-constructed shaft and rescued the six men from their perilous situation, which they had endured for five hours. Gen. William Sooy Smith, one of the contractors, and Col. William Patton, the company's engineer, were there, and viewed the operations with anxiety.

#### When to Expect Better Times.

In their circular for October 1, Messrs. Rhodes & Co., of Cleveland, indulge in the following prognostications:

The proverbial impatience of American business men seems to demand that, because now that the crops are assured, the stimulus should be immediately felt; and, indeed, if trade were very active we might expect such a result, but with the existing depression we have no reason to hope for a return of confidence and a revival in business until a large portion of the crop is marketed, which will not probably be until after the first of the coming year. We had very poor crops in 1881, but such was the activity in the iron trade that immediately succeeding the poor agricultural return we had a very lively fall and winter business, and did not begin to feel the evil effects until the spring of 1882. Reasoning by analogy, therefore, it will not be surprising if we do not experience the good results from our large crops until we are well along in the next year. The question that to-day overshadows all others is the political contest. As that can only be treated from a partisan standpoint, it would not be desirable in an article of this nature to enter upon its consideration. We think, however, that one wish is common to patriotic men of all parties, and that is that the result will be so decisive as to leave no ground for a dispute as to which candidate has a fair majority of the electoral votes, as was the case eight years ago. A disputed Presidential succession would surely neutralize all the good that we have reason to hope for from our splendid agricultural returns.

**Trade-Marks and Labels.**—Touching the distinction between trade-marks and labels, Commissioner of Patents Butterworth has decided that the proper construction of the statute is that the subject matter of an application for a label shall be that which may be properly claimed as a label, and not be merely subject matter for a trade-mark. But the statute does not mean to imply that, if certain subject matter is found to be incapable of registration as a trade-mark, it can nevertheless be registered as a label, for it may not be descriptive of the quality or nature of the goods, and therefore fail to constitute a label.

# WARD & PAYNE.

THE LARGEST

Sheep

IN THE

EVERY DESCRIPTION OF SHEAR



The Leading Numbers for the Eastern States are

Nos. 22, 26, 27, 29,  
and No. 200.

WARD & PAYNE

Strongly Recommend

ALSO

A TRIAL OF THEIR

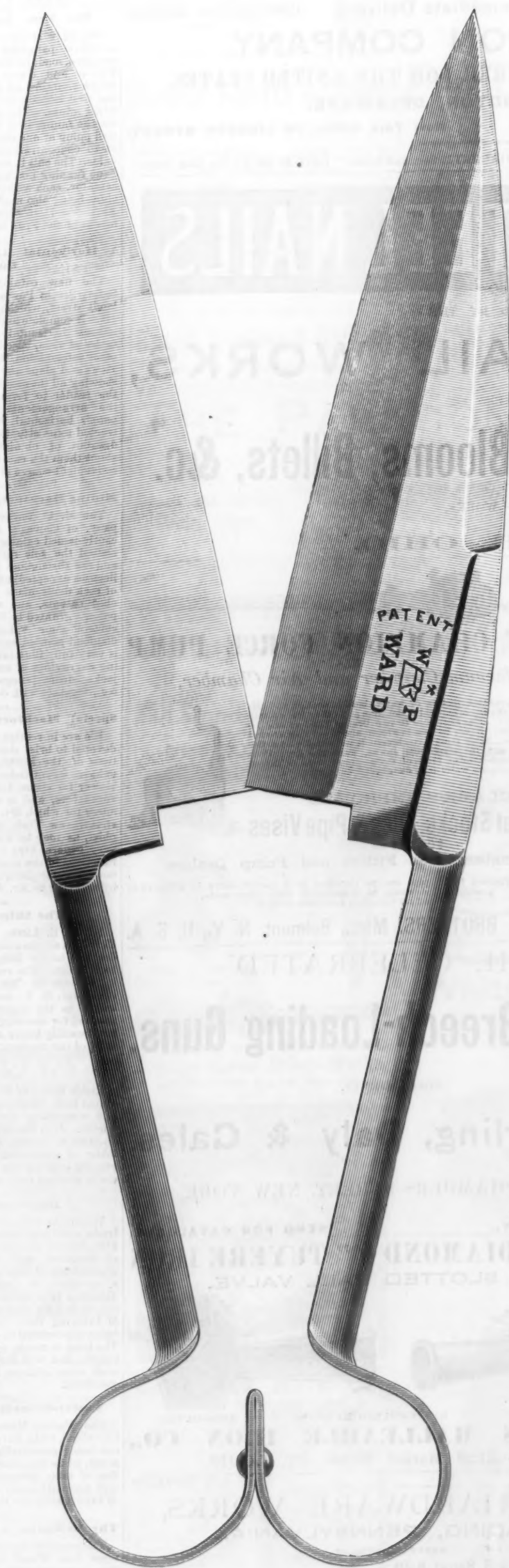
NEW PATENT,

No. 79 A. S.,



The recommendation being that both blades can be taken asunder, thus greatly facilitating the whetting and grinding of the Shear.

*All Shears Warranted to  
Give Satisfaction.*



PRODUCERS OF

Shears

WORLD.

MANUFACTURED TO ORDER.



The Leading Numbers for the Western States and Pacific Coast are

No. 38 Solid Neck Patent.

No. 38 Solid Neck,

WITH

Corey's Celebrated Adjustable Spring,

which spring can be attached to all single Bow Shears.

No. 50 Single Bow,

AND

No. 200 Double Bow.



The magnitude of their production, aided by the most perfect combination of machinery, enables them to quote prices which distance competition.

SHEFFIELD, ENGLAND.

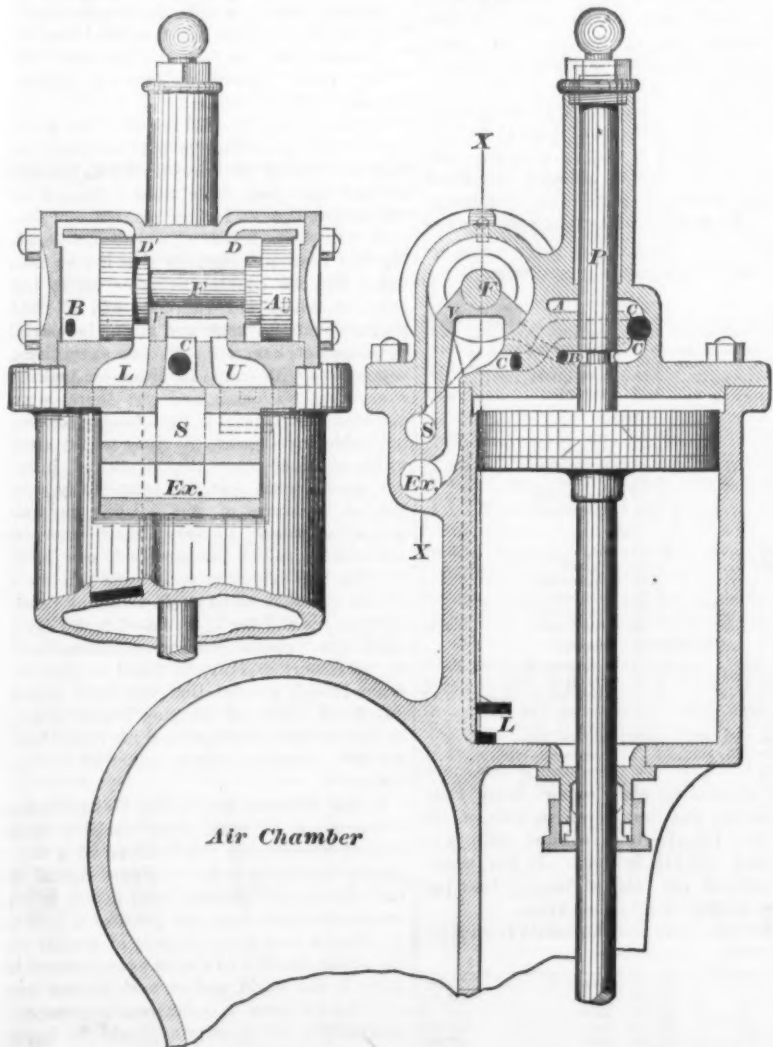
**Harlow's Valve Gear for Direct-Acting Steam Pumps.**

Mr. M. S. Harlow, of Hoboken, N. J., was recently granted a patent for an ingenious and simple arrangement of valve gear for direct-acting steam pumps. This gear, of which sectional views are shown in the annexed engravings, consists essentially of two moving parts, viz., the auxiliary valve P, arranged so as to form a continuation of the piston-rod, and the main valve V, moved by the plunger F. The left-hand cut is a section along the line X X of the vertical section. S represents the steam supply-pipe; E x the exhaust; L the main steam port to the lower end of the cylinder, and V that to the upper. The operation of the valve is as follows:

650 large and small springs, 18,700 washers, 800 brasses, 400 axles, 800 wheels, 1200 pounds of waste and 800 gallons of oil. This is a total of 85,500 pieces handled, and 68,040 nails. These cars, when completed and drawn out on the track, formed an unbroken line 3200 feet long, and weighed 1,800,000 pounds."

**Underground Electrical Conductors.**

The attention now being given to the important question of putting electric wires underground in large cities is illustrated by the number of devices for that purpose which are displayed at the Electrical Exhibition in Philadelphia. The *Public Ledger* of that city refers to them as follows:



SECTIONAL VIEWS OF HARLOW'S VALVE GEAR FOR DIRECT-ACTING STEAM PUMPS.

As represented in the cut, the main piston has reached the upper end of its stroke; the auxiliary valve P has connected ports B and C, exhausting the steam from that end of the auxiliary cylinder. Steam enters the other end through the port D, and thus reverses the main valve. When the main piston has reached the lower end of its stroke the ports A and C communicate over the end of the auxiliary valve P. Steam enters through the port D, reversing the main valve for the up stroke, thus obtaining a positive motion of the main valve without the aid of tappets, springs, combined levers, cams or similar devices. By the arrangement of the ports in the auxiliary cylinder the piston is prevented from striking the cylinder by means of steam cushions.

Another feature is that, if the main valve should be moved too far by its momentum, the cushion will return it to a fixed point at either end of its stroke, leaving the main steam ports fully open. The main steam ports are divided when they enter the cylinder, so that when the piston approaches the end of its stroke a part of the steam is cut off and the speed of the piston is reduced; also when the stroke is reversed only a portion of the steam at first enters the cylinder, thus giving a motion approximating that obtained by the crank and fly-wheel. This allows the water-valves time to regain their seats without shock, prevents the piston from striking the heads, and, in connection with the steam valve gear, makes a steam pump that is claimed to be practically noiseless at any speed.

**One Hundred Flat Cars Per Day.**

The Chicago *Inter-Ocean* of recent date, speaking of rapidity of work in the shops of the Pullman Palace Car Company says: "It having been said that the company were slow in filling their orders, the men in the freight shops, under the supervision of Superintendent G. A. McArthur, were recently allowed to show the rapidity of their work. The usual number of flat cars turned out is 25, but on that day 100 were built. This means that work was begun on 100 flat cars at 6.30 o'clock in the morning, and at 6 o'clock in the evening they were completed and painted, some of them even being properly lettered. This task was an unusual undertaking, and could not be done two days running, as it would completely exhaust the men. For this labor the number of men was not increased at all. All of the hands did their utmost, the different gangs vying with each other. The result was that two gangs succeeded in building five cars each. The average time expended in the building of one car was six minutes. To build these 100 cars it required the handling of 23 different pieces of lumber, 91 in number, or 9100 pieces in 100 cars; 31 different kinds of castings, 170 in number, or 17,000 in 100 cars; 35 different kinds of forgings, 79 in number, or 7900 in 100 cars; 24 different kinds of bolts, 174 in number, or 17,400 in 100 cars; 24 different kinds of nuts, 174 in number, or 17,400 in 100 cars; besides 900 ag-screws, 27 kegs of nails, 100 cotter-pins,

The Brooks system of underground conduction depends upon the use of oil as an insulator of the telegraph and telephone wires it is proposed to place underground. An iron tube like a gas-pipe is laid, with proper manholes and branches, within which are run the telephone and telegraph wires, each separated from its neighbors by a covering of cotton. When the system is completed, a heavy hydrocarbon prepared from petroleum by a special process is pumped into the line. Every precaution is taken to exclude moisture or foreign substances from the pipes, and the system is kept constantly under pressure, to make amends for leakage. In the exhibition the system is shown in actual operation, the line used being that laid down by the Pennsylvania Railroad, and containing 18 telegraph circuits in active operation, besides the telephone wire used.

The American sectional underground system is exhibited in operation. This system consists of a cast-iron viaduct laid underground, with arrangements for carrying wires through them without endangering insulation. At intersections and other convenient places manholes are arranged, which are large enough for a man to descend and arrange wires and make connections without difficulty. Where a large number of wires are to be carried the conduit is arranged with a series of trays, one above another, on which may be arranged any number of wires. This system has been in actual operation on Chestnut street, from Third to Broad, for about six months, and is stated to have been so far perfectly successful.

The Edison system of underground conduction, shown at the principal entrance, is adapted not merely to the Edison system of incandescent lighting, but to all purposes of electrical conduction. For the Edison system of lighting a special arrangement is necessary, on account of the very large currents which are employed. It consists of a wrought-iron gas-pipe of ordinary character, through which is run the heavy copper conducting wires previously insulated with Edison's insulating tape. In some cases these wires are still further protected from chance contact by a further wrapping of rope. Into the pipe is run his special insulating material, which hardens, but without cracking. The composition is a secret. The pipes so prepared are laid underground, being cut and screwed together like ordinary gas-pipe.

One novel feature of the Edison system is the three-wire system of conduction. In this system the current from two dynamos of equal power is carried over three wires instead of four. The positive pole of one dynamo is connected with the negative pole of the other, and from the connection is run the middle wire, as it is termed, of the system. The remaining negative and positive poles form the other two wires. If the dynamos are working equally, there will be no current over the middle wire, the two opposing currents exactly neutralizing each other. The current over the two outer wires, if they were connected, would be doubled in quantity—that is, it would be about 200 volts instead of 100, as is usually carried. Con-

nection is, however, made with the middle wire from each side wire, and thus the current is reduced to 100 volts. As, however, the current is higher in intensity a smaller wire can be used than would be necessary were the current of the normal intensity without danger of heating. If the intensity is double the wires can be made one-fourth the size, and, as one wire is saved out of every four, the total saving is represented to be 62½ per cent.

The Continental Underground Cable Company have an exhibit in the gallery. This system depends upon the use of dry air as an insulator. A suitable conduit is built with air-tight manholes and connections, and by means of a steam engine and a fan a current of dry air is forced into the conduit. A system of protection from induction is adopted for telephone wires. At the bottom of the conduit is arranged a small railway with an arrangement by which a small electric motor may be used to carry wires along the conduit. It is pointed out that if the arrangement of conduits was sufficiently extensive the electric railway would make an efficient parcels post in addition to its principal use. Next the Continental is shown Woodward's combination curb conduit. This is a conduit arranged along the curb, where it can be more readily examined than in the street. Arrangements are made by which steam-heating pipes may be arranged with the electric wires in the same conduit. The Philadelphia and Seaboard Telegraph and Cable Company exhibit a system which consists of a series of boxes made in suitable lengths in which the telegraph wires are placed and surrounded by a special insulating compound.

The Union Electric Underground Company exhibit in the annex a sample of their conduits, which consist of iron tubes, together with their method of insulating the wires to be passed through them. The National Underground Electric Company exhibit their conduit and a manhole. The conduits consist of tin tubes embedded in an artificial stone. Examples of terra-cotta, asphalt and artificial-stone tubes are also shown. The Cosmopolitan Electric Underground Telegraph, Telephone and Electric Lighting Company exhibit a section of their underground conduit. It consists of a terra-cotta pipe, along which is set at suitable intervals a series of perforated plates of some non-conducting material, and through these holes are drawn the wires it is designed to protect. Models of two conduits are shown in the gallery, labeled respectively the Anderson conduit and the Underground conduit of W. Hendley, Washington, D. C. The models are of wood, and no description of their design or use are submitted.

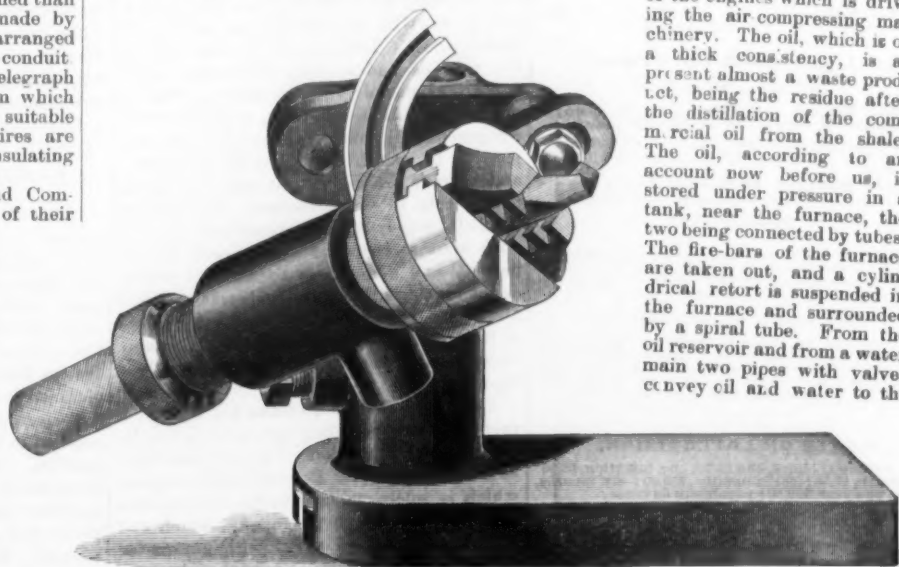
**New Adjustable Power Press.**

The press shown in the accompanying engraving is of the parabolic form, and its special features are stiffness and strength in

additional feature in this machine is the adjustable legs and the ease with which the bed can be raised and lowered or given an inclination, as circumstances may require. Adjusting the press in this manner is frequently a great convenience, especially where heavy dies are to be put in. The height of the bed may be increased or diminished, so as to make the press of the greatest convenience in doing different kinds of work. The clutch is of cast steel and is automatic in character. It is constructed so as to withstand severe strains. This press is built by R. C. Purvis, 4152 Elm avenue, West Philadelphia, Pa.

**Hand's Twist-Drill Grinding Attachment.**

Mr. S. Ashton Hand, of Toughkenamon, Chester County, Pa., has recently brought out an ingenious little arrangement for grinding twist drills. This tool, shown in the annexed cut, can be readily attached to any grindstone, emery or cutter grinder, and is adapted for grinding drills from ½-inch diameter down to the smallest sizes made. The drills can be given any amount of clearance desired for drilling metals of different densities and natures, and this in



HAND'S TWIST-DRILL GRINDING ATTACHMENT.

either direction—that is to say, a right or left hand drill can be ground with equal facility. The purpose of the manufacturer was to furnish an inexpensive tool that may be used with the ordinary grinding appliances common to all shops.

This tool is so simple as to need scarcely any explanation, and a boy of ordinary intelligence can be taught to grind drills with it in a very few minutes. In operation the drill to be ground is placed in the chuck with the edges of the lips horizontal, and extending from ⅓ to ⅔ inch from

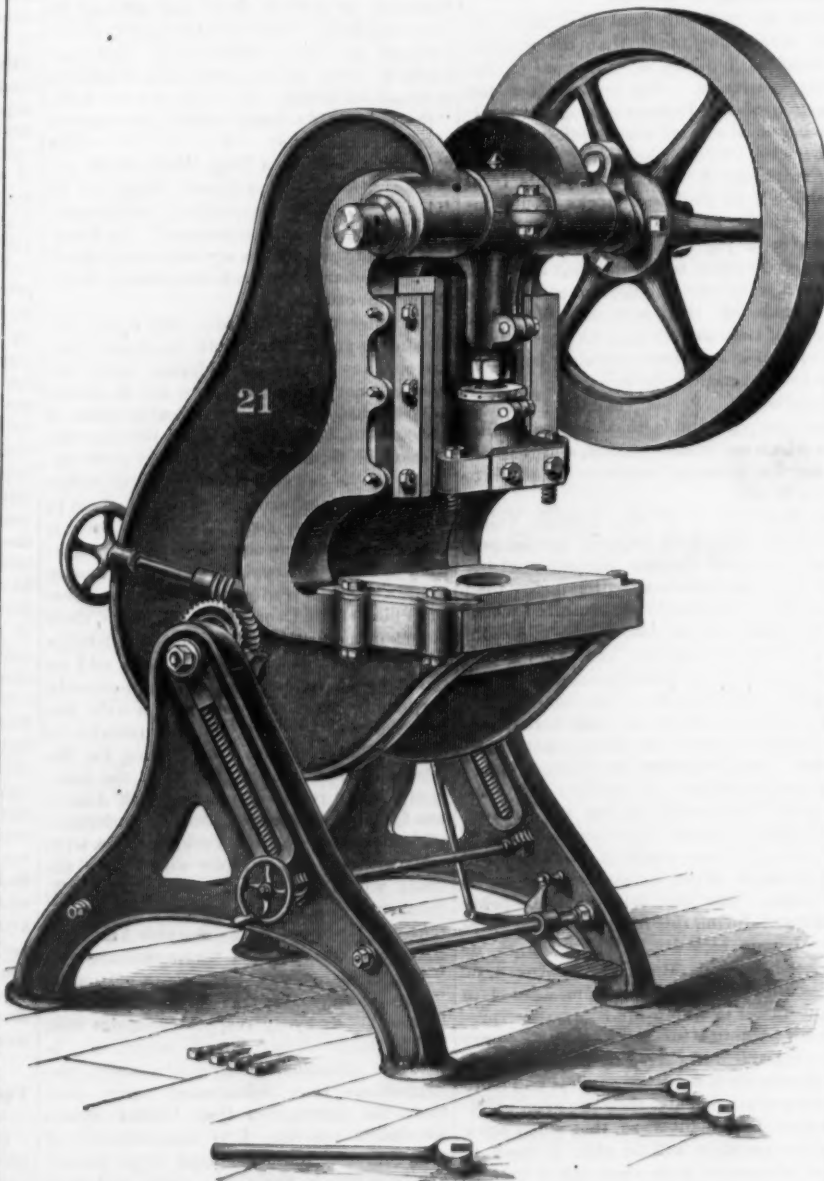
retort and the coil. The retort being heated, the water-valve is slightly opened, and a fine stream passing into the retort is converted into steam, which is carried through a superheating coil to a jet underneath the retort, from which jet it issues. The oil is then admitted in the same manner, and carried by another heating tube to the same jet, which it reaches in a nearly gaseous state. It is then caught by the superheated steam, and thrown against the convex bottom of the retort, the force of the impact breaking up into vapor any portion of the oil which the heat may not have already converted into gas.

In a short time, continues the article, the retort and heating tubes become red-hot. The steam has become a dry gas, which is thoroughly intermixing with heated carbon. The force of the jet sucks into the center of the flaming gases a current of air, which completes their combustion without producing smoke, dirt or residue. The result of the whole process is almost perfect combustion—an immediate and intense heat which consumes all the products, or, in other words, leaves no residue to be cleared away. The advantages claimed by the inventor of this system are that the retort acts, first, as a boiler or steam generator to start the fire; second, the retort is an atomizer, breaking all possible lumps into atoms; third, the retort is a deflector or director of the flame, distributing it equally to all parts of the furnace; and, fourth, its internal cubic area acts like the air chamber of a pump to keep a steady flow from the jet. The experiment—for it can be regarded only as such at present—is stated to be giving every satisfaction. While this may be the case it is questionable whether in the end commercial success would follow, and, while yet in the experimental stage, it would be by no means unusual should the invention show the experiences of many others in kindred fields and now long forgotten.

**Two Big Bridges for the Northwest.**

—The bridge to be built across St. Louis Bay, between Duluth and Superior, for the Northern Pacific Railroad, will be nearly 1 mile in length, divided into three sections, as follows: Drawbridge, 246 feet; the fixed truss span, 160 feet, and the pile bridging, 4290 feet. By the terms of the contracts the entire structure is to be completed by the last day of January, 1885, and work will be commenced as soon as a few details are arranged. The bridge which is being built for the Wisconsin Central Railroad, 4 miles east of Stillwater, Minn., will be 2340 feet in length and built entirely of iron resting on stone piers. There are nine piers, each resting on piling driven into the river bed about 15 feet until rock is reached. The piers are 34 feet 6 inches by 11 feet 10 inches at the bottom, 20 feet by 6 at the top, and about 46 feet high above low-water mark. The spans average about 150 feet in length, the channel span being somewhat longer than the others. The trestle approach on the Wisconsin side is to be of iron resting on square stone piers, of which there are 25 pairs. The superstructure will be entirely of iron, the bottom of the channel span being 82 feet above low-water mark, thereby obviating the necessity for a draw. The bridge is to be completed by the 10th of October.

A recent issue of the St. Louis *Midland Industrial Gazette* reported a sale of 6000 tons of No. 1 foundry at \$15, showing a lowness of price almost unprecedented. It is added that the sale was speculative, the purchaser (a prominent Pennsylvania capitalist) making the deal as an investment, expecting to realize a handsome profit within a year.



NEW POWER PRESS, BUILT BY R. C. PURVIS, PHILADELPHIA.

its various parts. It is intended for high speed and rapid work, and is adapted to the use of manufacturers of hardware, tinware and brass goods. As may be gained from the engraving, the cross-head is extra heavy and the body of the press is brought forward over the center of the bed, thus avoiding any spring of the press and insuring longer life to the dies. The shaft is cast steel, including the pitman. The adjustment of the cross-head is easily and quickly accomplished. An

the jaws. The base of the machine is now adjusted to bring the drill close to the grinding-wheel, contact with which is made by screwing in the feed screw. By taking hold of the knurled handle and moving it up and down, the grinding of one lip of the drill is accomplished. If the handle is raised up until the drill clears the emery-wheel, a slight pressure in either direction will cause it to turn. When it is turned half-way around, the index pin will drop

# The Iron Age

AND

## Metallurgical Review.

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#### Plain Talk from a Friend.

The Philadelphia *North American*, which has always been a staunch supporter of the manufacturing interest, indulges in some very blunt language in a recent issue. Referring to the manufacture of pig iron, it says:

At present there are but few works in Eastern Pennsylvania capable of producing iron at a cost which repays for the manufacture. Any sugar, cotton or woolen manufacturer knows too well where he would be he to use without improvement the machinery he employed in 1861, and yet too many of the pig-iron plants are practically in that condition. How many furnaces—exclusive of those owned by steel works—are capable of producing 100, 75 or even 50 tons per day? How many are in a position to make pig iron at \$15 per ton, f.o.b. cars? The cases in which the answer will be an affirmative one are so few that they can be counted on one hand. Let the stockholders or partners be willing to put up furnaces of the capacity and with the improvements such as exist at many of the furnaces in Western Pennsylvania, and they will find that they will be able to compete successfully with their rivals, and even at present depressed prices have something on the right side of their ledger at the close of the year. The first outlay will be great, but the return will in the end prove remunerative.

This is excellent, even if unwelcome, advice. Economy of manufacture is not alone to be secured through the reduction of wages. There are appliances not yet universally adopted which enable producers of pig iron to effect a very large saving in the quantity of fuel used to the ton of metal turned out. The product is also increased, so that fixed expenses are distributed over a greater tonnage, effecting a reduction of cost in that respect. Mr. Robert W. Hunt, of Troy, had this in mind when, in the course of his inaugural address as president of the American Institute of Mining Engineers, delivered at the Roanoke meeting in June, 1883, he said:

Unfortunately, when pinching times afflict us, when the necessities of curtailment of costs arise, we at once attack the wages problem as the certain and only way of salvation. That point of reduction of cost is so easily reached. Understand me;

I do not mean that labor should not bear its share of depression, as it certainly always will of prosperity. But if we would give deeper thought, and not permit the human proclivity for hitting some other body to satisfy us, we should make greater and more lasting savings. You may make a heavy reduction in wages, and save but a small amount per ton of product; and when times change the reduction must be restored. But save a few per cent. of loss in the processes of manufacture, and your aggregate is the same, and that reduction in cost remains permanent.

It happens, however, that the furnaces to which the *North American* calls attention have reached the limit of their ability to compete, even after reducing wages to the lowest point possible, and have blown out so generally that scarcely half of them are now in blast. It is not because there is not a market for at least part of their product, as Ohio and Virginia furnaces have been selling their product to a considerable extent in Eastern markets for several months. The reason is simply that these idle Eastern furnaces cannot compete with the prices named by their outside competitors. Instead of introducing improvements to enable them to continue in the business and hold their ground against the manufacturers of other sections, they have retired from the contest and await with impatience the advent of higher prices. Iron ore of the best quality can now be had at very reasonable rates, perhaps as cheaply as ever before. Fuel is not so dear as it has been, and improved equipment will considerably reduce its cost per ton of metal. Freight rates are very low, and there is but a comparatively short haul, at any rate to the consumer. Yet with a bountiful supply of the necessary materials, with labor anxious for employment at low figures, and a nearness to markets which ought to insure them the inside track against all distant competitors, the furnace owners of Eastern Pennsylvania, with a few notable exceptions, make no effort to retain their trade.

That it is possible to make pig iron at a profit even at prevailing prices is shown by the recent declaration of a dividend by a well-known Eastern Pennsylvania company which is solely engaged in the manufacture of pig iron. Another company, which had for years struggled along with antiquated furnaces, making a profit only during times of high prices, determined to remodel its furnaces, and the result is that now it is not making pig iron at a loss, although prices are very low. Possibly the *North American* comes very close to the lowest cost attainable when it asks, "How many are in a position to make pig iron at \$15 per ton, f.o.b. cars?" but we believe that with a properly constructed furnace, equipped with the most improved blowing and heating apparatus and economically managed in every respect, pig iron could be made for that figure at many points in Eastern Pennsylvania where furnaces are now standing cold and have been so standing for months.

It can be truthfully said that more pig iron is now being made than the country can consume, but this is only true of the country generally. We believe that the production of the Eastern part of the country is below the local consumption. Were it otherwise, with outside lots constantly being marketed at all Eastern points from Philadelphia to Portland, stocks would increase rapidly at Eastern furnaces. The production of pig iron in the East could be increased certainly to some extent if it were sold at a rate low enough to control the entire trade of this section. What the measure of that extent may be is a matter of conjecture, but there certainly must be room for a considerable expansion of Eastern production. Prices realized here now are not very profitable to the outside furnaces which sell in this market, and it would not require a heavy reduction in price to shut them out.

The furnacemen of the Lehigh Valley particularly have long enjoyed special pre-eminence among Eastern pig-iron makers. Their iron commands a better price than that of other districts, being preferred whenever the difference in cost is not unreasonably great to a consumer. The valley is well situated to reach all Eastern centers of consumption. Yet there are a very considerable number of furnaces out of blast in that section, in several cases an entire plant standing idle. It is true that the Lehigh Valley has a less percentage of furnaces idle than very many other districts, but its location, its proximity to some of the best markets of the country, should enable it to run several more furnaces, if not many more, than it is now doing. Are the idle furnaces being modernized during this interval of rest? Is their blowing capacity being increased, or their hot-blast apparatus being improved, or are the lines of their stacks being altered to permit faster driving, and greater production? Manufacturers in other lines are improving this dull period by putting in improvements, such as better engines and more modern machinery, and they are even erecting additional buildings, so that when brisk times return they will be able to work to better advantage and turn out a greater production than ever. Iron rolling mills are introducing steel-making processes or experimenting in that line to see what can be done most economically. Eastern furnacemen should not stand still during this period of general reconstruction, but fall in line and march abreast of their most progressive competitors in other sections of the country.

The responsibility of individual workmen for their own safety when engaged in hazardous work is of late being emphasized by

court decisions. The opinion has prevailed in many directions that an employer is responsible for the safety of his workmen in whatever they may be doing, but it begins to appear of late that, unless the individual workman exercises due caution at all times, the responsibility is removed from the employer and becomes his own. A case in point appears in reports of recent English decisions. A workman named Owen Jones was killed by a fall during the demolition of an old church in Liverpool. His widow's suit for damages resulted in a victory for the defendants. The latter were a firm of contractors. Some suggestive remarks were made by the judge before whom the case was tried. The man who was killed was at work in a tower about 40 feet from the ground. It appears that, without orders, the laborers piled loose stones and rubbish on the wooden floor instead of lowering them to the ground by steam cranes. The floor, which was admitted to be rotten, gave way, and Jones fell to the earth and was killed. His widow brought suit, and the defense insisted that the man came to his death through no fault of his employers, but rather through his own negligence. The justice "non suited" the plaintiff, and remarked that he wished he had the power to make her solicitor pay the costs of the defendants. It was a small case, but the points of it seem to be worth repeating.

#### Credits in the Export Trade.

Information gathered through consular reports to the Department of State, as recently published in these columns, affords abundant evidence that credit stimulates trade; that, in fact, without credit trade in many directions would be well-nigh impossible. Through a carefully-adjusted credit system English and German merchants have obtained control of nearly all the South American markets, and thus far have been enabled to hold their ground against all competitors. Americans have repeatedly endeavored to obtain a foothold by offering a superior class of goods, and at the lowest prices, but in most instances with indifferent success. The old-established methods have the preference with them, and the reason usually alleged is that the European manufacturer, perhaps because he is better advised by observing correspondents, adapts his wares more exactly to the wants of the consumer. Admitting that all this may be true, though we are inclined to the belief that American manufacturers are usually prompt in meeting the wishes of their customers in respect to patterns of goods, does it follow that American merchants must accept the alternative of adopting an extended and apparently hazardous credit system in distant parts of the world, practically beyond the pale of all law, so far as concerns their interests, or refrain from any attempt to enter the field? The consular reports above referred to show substantially that the trade of most of our American neighbors is based on credit. In Cuba, we are told, "the only trade based wholly on cash is 'the retail trade.' " "The credit system is a long chain which extends from the producer abroad or at home, through numberless middlemen, 'link by link, to the consumer.' " In Yucatan "cash transactions are extremely rare." Similar remarks are made concerning South American countries.

In order that Americans may more successfully extend their South American commerce, now that our shipping laws are deemed more auspicious, we see it openly advised that "the only practicable mode of doing this is by imitating the British, who establish foreign houses, and by conforming to the customs of other people rather than by endeavoring to persuade them to 'adopt our customs.' " Pertinent to this suggestion we remember that an extraordinary spirit of enterprise was aroused among certain export traders immediately after the Philadelphia Centennial Exhibition, their determination being to capture the foreign markets *vi et armis*. Goods were sold on credit to an extent that might reasonably surprise the most sanguine, and a wide distribution was effected. It only remains to observe that some are still waiting for the return of their money. Much of the testimony being received by the South American Commission, now or lately in conference with merchants in New York, favors a wide expansion of credit if we would take the trade which we court. For example, S. Samper & Co., of this city, who do an extensive business with Spanish-American countries, remark that "manufacturers in the United States treat their customers 'too rigidly,' " whereas manufacturers in England "in every respect recognize that 'it is the purchaser, not the seller, that is to be accommodated.' " Obviously, the suggestions thus volunteered carry with them the assumption that United States merchants entering into engagements of this character must command large pecuniary resources in their own right, and have at control banking facilities on a scale commensurate with the demands for "time" imposed by the foreign buyer as an essential condition in seeking his patronage. Cheaper money in Wall street nowadays, corresponding more nearly than in former years with rates prevailing in England, certainly favors Atlantic enterprise at this later day, unless, perchance, a panic like that of last May, accompanied by a sudden curtailment of loans, upsets all calculations. In reviewing this matter of credits in the ex-

port field it would appear that no rule can be laid down applicable to any class of merchants. On the contrary, each individual firm, before embarking in foreign ventures of any magnitude, must seriously consider the extent of its resources and its possible power of endurance under the varying conditions liable to be encountered, where only the smartest win.

#### Course of the Tin-Plate Market.

The course of the tin-plate market on this side has for some time past been a puzzle to most people in the metal trade. Although shipments this way have been but little in excess of the fiscal year 1883, the net import into the United States during the 12 months ended June 30 last being 224,688 tons, against 215,253 the previous year, the price of tin plates is lower at present than ever before, while stocks on this side are known to be lighter than they have been for many months past, just at a time when the demand is usually greatest. On January 3 the price of ordinary brands of tin plates averaged \$5.14; on October 3, \$4.85. The average of former years was as follows:

PRICE OF TIN PLATES IN NEW YORK.			
1879.			
January.....	\$5.35	July.....	\$5.50
February.....	5.70	August.....	5.40
March.....	5.75	September.....	5.57
April.....	5.67	October.....	6.66
May.....	5.66	November.....	7.25
June.....	5.48	December.....	7.11
1880.			
January.....	\$6.11	July.....	\$5.45
February.....	8.72	August.....	5.70
March.....	8.65	September.....	5.78
April.....	8.00	October.....	5.46
May.....	6.75	November.....	5.40
June.....	5.84	December.....	5.39
1881.			
January.....	\$5.32	July.....	\$5.42
February.....	5.32	August.....	5.52
March.....	5.37	September.....	5.47
April.....	5.37	October.....	5.52
May.....	5.27	November.....	5.82
June.....	5.42	December.....	6.25
PREVIOUS PRICES.			
July 1, 1874.....	\$8.71	February 28, 1878.....	\$5.66
April 28, 1876.....	6.58	March 31, 1878.....	5.66
May 5, 1877.....	5.97	April 30, 1878.....	5.72
September 7, 1877.....	6.00	May 31, 1878.....	5.37
October 19, 1877.....	5.97	June 15, 1878.....	5.33
December 30, 1877.....	5.25	July 15, 1878.....	5.33
December 31, 1877.....	5.77	October 3, 1878.....	5.18
January 1, 1878.....	5.75	December 18, 1878.....	5.28

The general tin-plate export from England during the first seven months of the year was 174,479 tons, against 156,179 in 1883, and 157,115 in 1882. It has, therefore, been at the rate of 300,535 tons per annum, against 267,735 last year.

In former years the shipments from England were:

Year.	Tons.	Year.	Tons.
1871.....	119,606	1877.....	153,226
1872.....	118,083	1878.....	155,340
1873.....	120,638	1879.....	197,849
1874.....	122,500	1880.....	217,699
1875.....	122,363	1881.....	220,300
1876.....	132,564	1882.....	225,021

Although there has been a considerable increase of tin-plate shipments from England so far this year, it has been to other countries, and not this way. In fact, the American market has been a great source of disappointment to makers in Wales, and they have been compelled to more assiduously cultivate other fields, while not losing sight of our market, which to them always remains the most important, our import having increased 78 per cent. during the four years 1880-83.

To some extent the lack of buoyancy in prices is probably due to the great popularity which steel plates have been gaining on this side for about a year past, a circumstance which may eventually revolutionize the tin-plate market. Aside from this, the situation here seems sound enough. Crops have been unusually large, including fruits; provisions are cheap, and so is petroleum; building has been fair all over the country, and the consumption of tin plates must have been very large, to judge from the low stocks, in spite of an ample importation. To some extent tin plates may have suffered from the general decline in merchandise of all sorts since the beginning of the year, and the utter discouragement which has seized on all speculation for a rise since the May panic.

Since 1879, usually in October, people have been looking for a "boom," but nobody thinks of it now, although prices are, on the whole, lower than they were in 1878. The consumer has no reason to be sorry that the era of booms has departed for the time being; what he wants is a moderate ruling for raw material, and steadiness, and he finds both in tin plates so far this year, which have fluctuated less than any other article, and in nine months only declined 6 per cent. It is not likely that they will decline further at present, while at any moment the revival of the legitimate fall demand may restore them to what they were worth early in the year.

#### The Revival of American Shipping.

Increasing interest is being taken in this question, which has become an absorbing topic in many business circles. Among the houses engaged in foreign trade it is quite natural to expect to find it a constant theme of discussion. Associations of shipowners and assemblies of the various craftsmen connected with the building, supplying and running of ships seldom meet without taking some action suggestive of the impatience with which they await the day when this country will turn its earnest attention toward the development of its ocean carrying trade. And even those who are not directly connected with foreign commerce or with

the navigation interests are looking in this direction for an awakening of business energy which will restore activity to our depressed industries. If the building of ships for ocean service were to be started in this country on a scale commensurate with the magnitude of our foreign commerce, a tremendous impetus would be given to business in so many lines of manufacture that every industry would be affected. At a recent meeting of representatives of pilot associations of most of the coast States, which was held in this city, Capt. Bedford Pim, of the British Navy, made an address, in which, among other things, he said: "Your 'shipping has fallen off simply from the 'tendency of your countrymen Westward,' where, in railroading, in ranching and in 'farming, money is to be made much more 'rapidly than in the old-fashioned line of 'commerce on the ocean. Reaction will 'take place sooner or later—I believe 'sooner than you think.' "

While Captain Pim did not give the causes of the original decline in our shipping, he very well stated the reason why no general attempt has been made since to build it up and restore it to its former magnificent proportions. Now, however, as railroad building has been so overdone that it may take years for the country to grow up to the point at which our railroads will all find profitable employment, and as our industrial development has, with but few exceptions, supplied us with ample facilities for making everything we need, and yet there is an abundance of capital in the country seeking profitable investment, the time would seem to be at hand when the work of internal development can be temporarily suspended by some of our leading capitalists, who ought to turn their energies and abilities to this comparatively new field. Captain Pim evidently entertains this view of the question, as he made frequent references in his address to his belief in the early birth of a "magnificent mercantile marine." It was remarkable that he failed to take the usual British ground that our tariff policy interfered with our shipping interests, but, on the contrary, he expressed his regret that his own country was an adherent to free trade.

It may be necessary for the United States Government to take some decisive steps toward encouraging the building of a mercantile marine in order to divert capital in that direction. Nobody will invest in an enterprise that does not promise a profit. As there is now an oversupply of vessels on the ocean, trading to almost every accessible point in the world, and several nations are striving for oceanic commercial supremacy, competition by Americans would be hopelessly unprofitable without some special advantages conferred whenever American goods are carried. What the nature of such encouragement should be is in dispute, and there are strenuous advocates of various schemes, but it now seems probable that the general interest being taken in this question will influence Congress to make a decisive step in some direction which will be acceptable to those interested. The appointment by the President of a commercial commission to visit Central and South America was done in accordance with an act of Congress, the passage of which showed that our Representatives are alive to the importance of doing something to expand our trade with countries which consume such productions as we have to offer. Their report will undoubtedly deal with the necessity of more frequent communication with our Southern neighbors. The Brazilian consul-general at this port recently said: "The great bulk of the Brazilian trade is in 'English hands, and the cause of this rests 'with the Americans. The United States 'might control the bulk of the Brazilian 'trade if they would, but the merchants 'here do not go about it in the right way. 'The first requisite for successful trade be- 'tween the Empire and the Republic is fre- 'quent and rapid communication between 'the two countries by an American line of 'steamers.' " Foreign testimony to the necessity of our action in this respect being so strong, it is to be hoped that efforts in the line of resuming our old place among the commercial nations of the world will be redoubled by those of our citizens who realize the importance of the movement.

#### Recent Trade Developments.

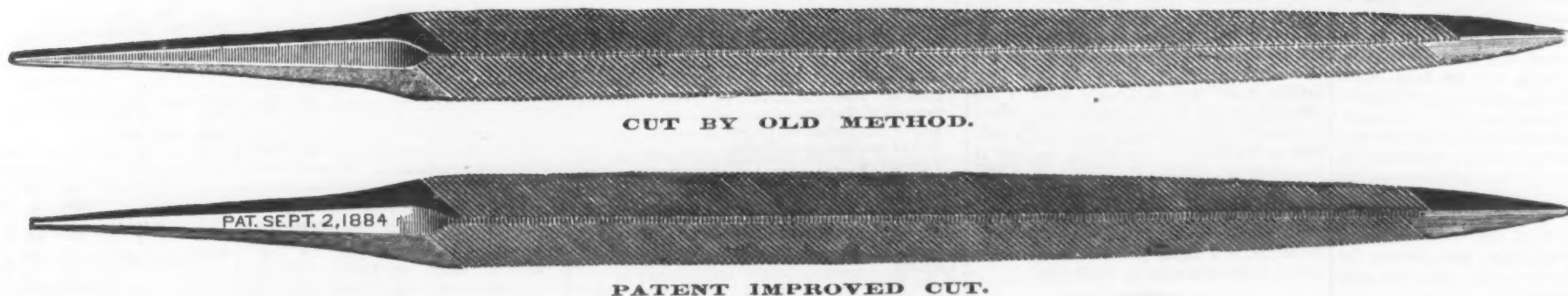
Some rather significant occurrences have recently taken place in the iron and steel trades. Prominent among them is the matured scheme for restricting the production of steel rails. When the movement in this direction was undertaken a short time ago there were those who regarded the attempt with many misgivings, having little faith that the manufacturers would agree upon any plan in the nature of a combination. At present, however, there is every reason to believe that the manufacturers are at last in accord, and that the reckless competition which resulted in depressing prices to an abnormally low point has been checked. Prices are much firmer, and sales to some extent have been made at higher prices. It may be possible to place orders with some companies at \$29, but it is asserted that there are very few sellers at that rate, and that \$30 at mill will soon be the minimum rate, most of the mills now in operation having secured work for a considerable time ahead. The arrangement among the manufacturers is not in the nature of a pool, nor



# NEW AMERICAN FILE CO., PAWTUCKET, R. I.

## MANUFACTURERS OF

# FILES AND RASPS.



### To all whom it may concern:

There has been just cause for complaint at the edges of the Three-Square Files breaking down. Every manufactory in the country makes Three-Square Files by the same method, and every user of the Three-Square File is aware that their edges have always been defective. With these facts in view, we present to the public a Three-Square File whose edges are as strong as its sides.

The mode of manufacturing these PATENT Three-Square Files is very simple of itself; still, those who have used them will affirm that they will do twice, and some even four times, as much work as any Three-Squares they ever used.

See below names of Representative Corporations, Firms and Individuals who have used and reported upon this improved Three-Square Saw File. We do not claim that the superiority of this PATENT Three-Square is the result of any Hocus Pocus process, as any mechanic can see at a glance that from the mechanical construction of its edges it must of a necessity do more work than any file of its kind ever before offered to the public.

To the dealer this file will yield a handsome profit, and to the consumer One Hundred per cent. advance in price would not warrant buying any other file of its class. We warrant every file to do twice the work of any other Three-Square Saw File that can be produced, "either Foreign or Domestic." **BEWARE OF IMITATIONS.** Write for Sample Lot, Price and Terms.

April 21st, 1884.

The File was too small for the 9-inch circular saw, on which it was used "twice." The saw is hard and is severe on all Files, sometimes wearing out a (name withheld) 7-inch File at one sharpening. We return the File by mail.

WESTCOTT & THOMSON,  
710 Filbert St., Philadelphia, Pa.

March 31st, 1884.

The Files are the best; the principle is right. When we are in need will send you an order.

W. T. BURGESS, Albany, N. Y.

May 6th, 1884.

The Files are the best; and the principle is right. The File cuts unusually smooth.

THE WALES WHEEL COMPANY,  
Bridgeport, Conn.

July, 1884.

I think the File is the best, and the principle is just what is wanted, and will be a great saving to the consumer. E. A. WALKER, Ansonia, Conn.

June 10th, 1884.

I think your Files far ahead of anything in the market in the File line. C. R. BECKER,

Albany, N. Y.

July 16th, 1884.

The Files are the best; principle is right. I find they do equally as well on fine-tooth saws as on coarser. W. A. BROWN, Waterbury, Conn.

June 23d, 1884.

The Files are the best; principle right. I like your Files. When can I get them?

J. E. SHAW, Bridgeport, Conn.

April 4th, 1884.

The Files are the best: the principle is right. They are the best File I have got for a number of years, for I have filed with them, and one corner is as good as a whole File. JAMES S. SIMPSON,

1321 Mount Holly st., Philadelphia.

April 15th, 1884.

The Files are the best. Would recommend them in preference to any other, if they are all like that one, which filed nine saws, and five of them were high-tempered saws. HARRISON W. SMITH,

Lewiston, Me.

February 27th, 1884.

Files A. 1. Good as I want. Shall use them in preference to any others. C. H. ANNABLE,

Springfield, Mass.

January 7th, 1884.

The Files are the best. Have filed three saws with one edge of sample.

J. R. WHITE,

Pawtucket, R. I.

February 8th, 1884.

The Files are the best. Will last longer than any two I ever used. EMERSON BABBITT,

Taunton, Mass.

March 4th, 1884.

The Files are the best. Would recommend them in preference to any other. I think they are better than the Stubbs files.

LITTLEFIELD STOVE CO., Albany, N. Y.

March 4th, 1884.

The Files are the best. Think the principle right. Have filed 16 saws with one, so that speaks for itself. DEMPSEY'S BLEACHERY,

Pawtucket, R. I.

February 5th, 1884.

Best ever used. Will do twice to three times the usual work. SLATER COTTON COMPANY,

Pawtucket, R. I.

January 25th, 1884.

Will file two to three times as many saws as ordinary files. Files 12 saws with 3/4-inch File.

FALES & JENKS MACHINERY CO.,

Pawtucket, R. I.

### Pawtucket, R. I.

T. C. Barnes,  
Pawtucket Steam & Gas Pipe Co.,  
H. W. Shaw,  
Chas. T. Hopkins,  
J. R. Belfield, M. M.,  
H. M. Rounds,  
H. N. Reed & Co.,  
J. S. Capron,  
Pawtucket Hair Cloth Co.,  
R. I. Cardboard Co.,  
Bliss Manufacturing Co.,  
Union Wadding Co.,  
J. S. White,  
R. H. Simmons & Son,  
D. W. Southwick,  
George Robinson,  
T. D. Rice & Co.,  
Central Falls Woolen Co.,  
O. H. Smith,  
Fales & Jenks Machine Co.,  
James Brown,  
W. J. Hood,  
Weatherhead, T. & Co.,  
Slater Cotton Co.,  
J. T. Cottrell,  
American Supply Co.,  
Geo. W. Arnold,  
Wilmarth & McKillop,  
D. A. Kelley,  
Frank Lambert,  
Dempsey Bros.,  
J. O. Draper & Co.,  
Greene & Daniels Mfg Co.

### New York.

F. A. Balaz,  
L. H. Hoffman,  
D. Morrissey,  
M. L. Kenney,  
Chas. West,  
Chas. B. Many,  
Wm. V. Vanzandt,  
Samuel Tyrrell,  
James A. Allen,  
Michael Joyce,  
Henry Egbert,  
George Barrow,  
Thos. S. Reisman,  
Frank R. V. Heaton,  
Wm. H. Connelly,  
A. Kimball & Son,  
James Fee,  
W. McDonough,  
F. A. Seighardt,  
Joseph Cabus,  
Freeland Tool Works,  
F. Mahstadt,  
John Jennings,  
S. Protache,  
Thomas Keegan,  
George May,  
Joseph Darwent,  
H. Mandeville & Son,  
Howland & Leis,  
D. Dose,  
P. Frydell,  
E. Lewis,  
Weser Bros.,  
J. P. Ryan,  
James H. Taiman,  
John L. Carr,  
John Crank,  
Geo. Steck,  
G. Ryerson,  
F. Freeland,  
G. Schoonmaker,  
Ed. J. Holden,  
John Kircher,  
Woodruff, Renkila & Bayer,  
E. H. Hinners,  
J. Dingot,  
J. T. Jones,  
Bernard Manufacturing Co.,  
Wm. Kirker,  
H. N. Doring,  
Wm. Prosser,  
Joseph F. Martel,  
Peter Ney,  
E. M. Pierce,  
Daniel Gladding,  
Ely Morell,  
F. S. Bliffus,  
John Tomlinson,  
Chas. H. Hodgson,  
Henry D. Damon,  
W. R. Smith,  
P. D. Conant & Co.,  
Philip Grinnell.

### Jersey City.

B. F. Cordan,  
James Rafter,  
John H. Rafter,  
Stephen Richards,  
Chas. H. Pells,  
Robert Hood,  
Flax & Wilbur,  
M. Farley.

### Boston, Mass.

M. Cushman,  
J. Whitehead,  
F. P. Margerson,  
Rowell O'Brien,  
H. Helmbold,  
D. W. Hurd,  
Frank Sheffield,  
Edward C. Nichols,  
Amos Doe,  
Hammond & Son,  
Charles Fuller,  
I. M. De Ioff,  
F. Brown & Co.,  
C. Sullivan,  
J. E. Joseylin,  
George E. Weber,  
P. W. Case,  
T. H. Reynolds,  
R. O. Dunn,  
H. H. Wakefield,  
Alex. B. Pinkham.

Boston Nickel Plate Co.,  
G. C. Lowe,  
A. S. Haven,  
Joseph Woodward,  
Daniel Carty,  
A. C. C. & Co.,  
B. J. Merritt,  
H. G. Healey,  
Wm. D. Egan,  
Briggs Bros.,  
W. T. McFarland,  
James Milligan,  
Ira C. Bumpas,  
F. Lothrop,  
Geo. J. Stevens,  
W. H. De Lue,  
J. F. Brown,  
B. E. Hamlinway.

### Brooklyn, N. Y.

Wm. D. Kinkade,  
Thos. Kipler,  
David H. Williams,  
Cross, Ausdin & Co.,  
Samuel Drew,  
E. F. Herd,  
Dominick Desilippi,  
B. S. Bosard,  
Wm. Henry Stevens,  
Joseph Larner,  
James B. Twait,  
Cheeseboro, Whitman & G.,  
C. H. Tiebout,  
E. Dawling,  
John Halley,  
K. B. Nimmo,  
M. J. Murphy,  
Thos. Slagg,  
John T. Perry,  
Wm. J. McGraw,  
Philip H. Gill,  
Thomas Lynch,  
Cornelius Hoogland,  
Frank Schmachtenberger,  
Joseph Larner,  
Samuel E. Burris,  
Wm. Nicol's Sons,  
Edward Morton,  
Bishop Bros.,  
G. & C. Pastfield,  
Henry A. Rogers,  
Riley & Cowley,  
J. Hodgson.

### Woonsocket, R. I.

B. S. Darling,  
J. E. Bradford,  
H. C. Lazelle,  
W. H. B. xter,  
Matthew Marty,  
J. McCloskey, M. M.,  
Chas. Berard,  
John Dixon,  
D. S. Fuller.

### Bristol, R. I.

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Namquit Mills.

### Syracuse, N. Y.

Sweets Mfg. Co.

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O. N. Shaw,  
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N. P. Tillson,  
T. T. O'Keefe,  
J. T. Jones,  
Bernard Manufacturing Co.,  
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Ely Morell,  
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John Tomlinson,  
Chas. H. Hodgson,  
Henry D. Damon,  
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P. D. Conant & Co.,  
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Hartford W. W. Mattress Co.,  
Strickland & Shay,  
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Pratt & Whitney Co.,  
Barrett Bros.,  
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H. E. Hubbard.

### New Haven, Conn.

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Clark & Bardsley,  
New Haven Clock Co.,  
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Brett & Manning,  
R. Field,  
E. A. Folsom,  
Sargent & Co.

### New Bedford, Mass.

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Orville Haskins,  
M. F. Kennedy,  
Brownell, Ashley & Co.,  
Jethro C. Davis,  
Edward B. Coffin,  
Masher & Brownell,  
C. F. Clark,  
Wm. A. Kirby.

### Providence, R. I.

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Cleveland Brothers,  
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Wm. B. Healey,  
Prov. Saw and Tool Works,  
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P. & W. R. R. Repair Shop,  
Barstow Stove Co.,  
Harvey Screw & Bolt Co.,  
Towel Rack & N. Mfg. Co.,  
Providence Machine Co.,  
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Geo. B. Underwood.

### Waterbury, Conn.

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James Stovel,  
James S. Neill,  
A. S. Jenks,  
W. A. Brown.

### Worcester, Mass.

L. Moore,  
W. H. Walker,  
C. B. Rawson,  
Cutting & Bishop,  
J. B. Cunnans,  
Jason Fulnam,  
Dennis Blair,  
F. M. Cross,  
E. C. Smith,  
J. D. Seagraves,  
Chas. Clark,  
Chas. L. Palmer,  
Horace A. Richardson,  
Jeremiah Winn,  
A. Burlingame,  
H. A. Richardson.

### Taunton, Mass.

W. H. Chace,  
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Nathan Rand,  
Eugene F. Bassett,  
F. R. Washburne,  
Emerson Babbitt,  
E. W. strange,  
Everett Fuller,  
Peck & White,  
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Whitteman Mfg. Co.,  
Chace R. Pierce.

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Alenason Johnson,  
Geo. E. Page,  
H. J. Chandler,  
Ana C. Woodward,  
E. S. Stacy,  
Ana Flak.

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Wm. D. Stride,  
Aug. Westenberg,  
R. Robinson,  
E. P. sid I,  
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McCracken, Hask & Co.,  
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Callahan,  
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James Dunlap,  
H. B. Tawresay,  
D. F. Seigel,  
George Zippler,  
John H. Zippler,  
Thos. Gullman,  
Daniel Leonard,  
John M. Smith & Sons,  
J. Jacob Shannon,  
David Gardiner,  
The Machine Tool Works,  
D. W. Eisenberg.

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Ridgeway Pat. Refrigerator  
Co. (Limited)  
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L. P. & Co.,  
G. A. Hoover,  
Westcott & Thompson,  
Wm. Thumanger,  
American Meter Co.,  
H. F. Foster,  
Andy Will,  
H. Nicholls,  
W. D. Burkhart,  
C. Kelley,  
Jacob Rush,  
Geo. B. Russell,  
Chas. B. Stroude,  
Henry Lott.

### Troy, N. Y.

N. R. Dutcher,  
Geo. Vallier,  
N. B. Gardner,  
John Gocha,  
F. N. Barge,  
Frank F. Salisbury.

### Albany, N. Y.

Erasmus Ewing,  
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Julius Hakin,  
P. K. Dederick & Co.,  
S. Kleyser,  
John S. velt,  
Littlefield Stove Co.,  
John Orton, M. M.,  
Otto N. Hanson,  
Geo. H. Chney,  
John Miller I.,  
C. H. Havens,  
Eugene H. Harris,  
Marshall & Wendell,  
E. McCannan,  
Chas. H. Rosner,  
E. W. Cameron,  
W. T. Burgess,  
C. R. Becker,  
Nicholas Colling.

### Bridgeport, Mass.

Bridgewater Iron Co.,  
Eagle Cotton Gin Co.,

### Pittsfield, Mass.

W. C. Stevenson,  
Franklin Carpenter,  
Talsott Barlow,  
Michael Boudoin,  
Alfred Brock,  
Chas. H. Hubbard,  
James Mangon,  
E. Wilkins,  
A. F. Garlick.

### Bridgeport, Conn.

Wm. H. Playfoot,  
Lewis F. Ward,  
G. Keenan,  
F. H. Skilmore & Sons,  
Talsott Barlow,  
Geo. F. Barlow,  
O. S. Platt & Co.,  
Spring Perch Co.,  
The Elwell & Kean Mfg. Co.,  
Leonard Pratt,  
The Wales Wheel Co.,  
W. H. Cutts, Jr.,  
W. M. Harris,  
J. E. Shaw.

### New London, Conn.

T. E. Beach,  
Albertson & Douglas M. Co.,  
Geo. A. Richards,  
W. H. Burdick,  
John A. Comstock,  
Reeves & Kelly,  
Geo. R. Miller,  
Geo. W. Rogers,  
John G. Butler,  
Jos. L. Roubie.

### Westerly, R. I.

Albert S. Maine,  
C. W. Willard,  
A. A. Sullivan,  
G. B. Hiscox,  
Herbert T. Kenyon,  
James A. Horton,  
Chas. B. Barker.

### Chester, Pa.

J. Irvin Taylor,  
Robert Wetherell & Co.

### Fitchburg, Mass.

Simonds Mfg. Co.

### Manchester, N. H.

B. F. Porter,  
S. O. Forsaith & Co.

### Ansonia, Conn.

J. W. Begg,  
E. A. Walker.

March 6th, 1884.

The principle is right. Have given your File a fair trial, and when we have used up our present stock will order some of yours.

### FREELAND TOOL WORKS.

558 West 34th street, New York.

January 25th, 1884.

I find the File the best I ever used. Stop when you come this way. A. WHITE,

98 Washington street, Boston.

February 2d, 1884.

The Files are the best. Please send us two dozen 4 1/2-inch Taper Saw Files, at earliest convenience.

### HARVEY SCREW AND BOLT COMPANY.

Providence, R. I.

January 21st, 1884.

The Files are the best; principle right. Have filed 10 saws. W. W. DAVIS,

Taunton, Mass.

February 16th, 1884.

I have used your File, and have filed more saws than with any other file, and the File is good yet.

EUGENE P. BASSETT, Taunton, Mass.

January 29th, 1884.

Your Files are good, and I hope to send you an order for some soon.

### FREDERICK SHEFFIELD.

1712 Washington street, Boston.

January 16th, 1884.

The Files are as good as can be. I have used files for the last 18 years, and find sample best I ever used. M. CUSHMAN, Boston.

March 1st, 1884.

I have filed more saws with that File than any other. Have shown it to several and all like the principle. JETHRO C. DAVIS,

New Bedford, Mass.

March 13th, 1884.

The Files are the best; principle right; put them in the market soon as you like; are bound to sell.

JOHN CRONK, 105 W. 37th st., New York.

February 27th, 1884.

The Files are the best; the principle is right. They are better than the old style, filing smoother and not chattering. R. F. CORDNAM,

Jersey City, N. J.

March 7th, 1884.

Having found your sample excellent, let your agent call for order when passing.

S. BRUTSKES, 106 W. 37th st., New York.

March 8th, 1884.

The Files are the best; the principle is correct. These Files I shall use hereafter, and can well recommend them to all users of files.

WM. H. PLAYFOOT,

11 George st., Bridgeport, Conn.

March 6th, 1884.

The Files are the best I ever used, and any one wishing to make inquiry of me to these facts can do so by calling at my shop. F. MAHSTADT,

678 1st av., New York.

January 28th, 1884.

The Files have no equal, and will do twice the work of any other three-square taper. The cheapest file yet made. WM. J. HOOD,

Valley Falls, R. I.

March 15th, 1884.

Think the sample filed three times as many saws as any other file we ever used.

### BRIDGEWATER IRON CO.,

Bridgewater, Mass.

March 10th, 1884.

The Files are the best; the principle is right. The corners do not break and become notched, like others. T. E. BEACHED, New London, Conn.

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Stevens J. & Co., Chicopee Falls, Mass.	43
<b>Artisan Well Supplies.</b>	
Lovejoy John F., 102 Chambers, N. Y.	43
<b>Asbestos.</b>	
The Asbestos Packing Co., Boston, Mass.	14
Chalmers-Spence Co., 419 8th, N. Y.	12
<b>Asbestos Paints.</b>	
H. W. Johns Mfg. Co., 87 Maiden Lane, N. Y.	41
<b>Axles and Bits.</b>	
Jennings C. E. & Co., 96 Chambers, N. Y.	31
Bates, Wilson & Co., 204 Broadway, N. Y.	14
<b>Axles, Springs, &amp;c., Manufacturers of.</b>	
Cook R. & Sons, Winsted, Conn.	13
Gautier Steel Dept. of Cambria Iron Co., Johnstown, Pa.	34
Liggett Spring & Axle Co., Pittsburgh, Pa.	8
Winsted R. W., Brooklyn, N. Y.	58
<b>Axes.</b>	
Mann W. J. & Co., Lewistown, Pa.	2
Peck A. G. & Co., Cohoes, N. Y.	52
<b>Bakers.</b>	
F. W. Gaulaudet & Co., 2 Wall, N. Y.	9
<b>Bar Iron.</b>	
Virginia Nail and Iron Works Co., Lynchburg, Va.	14
<b>Barb Wire and Fence.</b>	
Hals J. & Co., Buffalo, N. Y.	38
Hawk Eye Steel Barb Fence Co., Burlington, Vt.	3
Low Barb Wire Co., 98 Reade, N. Y.	3
Thorn Wire Fence Co., Chicago, Ill.	3
Washburn & Moen Mfg. Co., Worcester, Mass.	2
<b>Bellows, Manufacturers of.</b>	
Bullock T. H., Cleveland, O.	5
Flacus Wm. & Son, Pittsburgh, Pa.	50
Scott Geo. M., Chicago, Ill.	38
<b>Bells (Sleigh).</b>	
Bevin Bros. Mfg. Co., Easthampton, N. Y.	10
Chapman Mfg. Co., Meriden, Conn.	10
<b>Belting, Makers of.</b>	
Alexander Bros., 412 N. 3d, Philadelphia, Pa.	32
Main Belting Co., Philadelphia, Pa.	28
S. Y. Belting & Packing Co., 13 & 15 Park Row, N. Y.	13
<b>Belt Oil.</b>	
Post E. L. & Co., 10 Peck Slip, N. Y.	31
<b>Bicycles.</b>	
Pope Mfg. Co., 507 Washington, Boston, Mass.	52
<b>Bird Cages, Makers of.</b>	
Jewett John C. & Sons, Buffalo, N. Y.	31
Lindeman O. & Co., Buffalo, N. Y.	31
Maxwell John, 247 and 249 Pearl, N. Y.	7
Pierce Geo. N. & Co., Buffalo, N. Y.	30
<b>Bit Braces.</b>	
Amidon & White, Buffalo, N. Y.	42
Ives W. A. & Co., New Haven, Conn.	34
<b>Bit Holders.</b>	
Graham J. H. & Co., 113 Chambers, N. Y.	8
<b>Blank Books, Manufacturers of.</b>	
Allen Wm. & Co., 440 Broome, N. Y.	11
<b>Blank Books, Tackles, Makers of.</b>	
Bacon & Loud, Boston, Mass.	51
Cleveland Block Co., Cleveland, O.	46
Detroit Block Works, Detroit, Mich.	7
Lovejoy J. F., 102 Chambers, N. Y.	43
McCoy & Sanders, 38 Warren, N. Y.	46
McMillan Wm. H., 113 South, N. Y.	11
Penfield Block & Packing Co., Chicago, Ill.	14
<b>Blowers, Forge and Pressure.</b>	
Huyett & Smith Mfg. Co., Detroit, Mich.	38
<b>Boiler Cleaners.</b>	
Cockshutt & Lord, Savannah, Ga.	50
<b>Boiler Compound.</b>	
Crescent Mfg. Co., Cleveland, O.	14
<b>Boiler Feeders.</b>	
The Miller Co., Canton, O.	49
<b>Boilers, Steam.</b>	
Babcock & Wilcox Co., 30 Cortlandt, N. Y.	12
Edge Moor Iron Co., 19 Liberty, N. Y.	12
Harrison Boiler Works, Philadelphia, Pa.	50
Lawson Non-Explosive Boiler Co., 155 Broadway, N. Y.	14
Wetherill Robt. & Co., Chester, Pa.	51
<b>Boiler Plates.</b>	
Wm. McMillan & Sons, Reading, Pa.	40
The Seidel & Hastings Co., Wilmington, Del.	28
<b>Bolt and Rivet Clippers.</b>	
Chalmers, Brother & Co., Philadelphia, Pa.	4
<b>Bolt Cutters.</b>	
Howard Iron Works, Buffalo, N. Y.	40
Sellers Wm. & Co., Philadelphia, Pa.	70
Liberty, N. Y.	51
Wiley & Russell Mfg. Co., Greenfield, Mass.	41
<b>Boring Machines.</b>	
Amidon & White, Buffalo, N. Y.	42
Ives W. A. & Co., New Haven, Conn.	34
<b>Boxes for Hardware.</b>	
Greene S. H., 12 Murray, N. Y.	32
<b>Brackets.</b>	
Penn. Hdq. Works, Reading, Pa.	15
<b>Brass, Manufacturers of.</b>	
Ansonia Brass & Copper Co., 19 Cliff, N. Y.	50
Bridgeport Brass Co., Bridgeport, Conn.	50
Brown & Bros., 81 Chambers, N. Y.	2
David John & Sons, 109 John, N. Y.	2
Holmes, Booth & Haydens, 25 Peck Slip, N. Y.	2
Plume & Atwood Mfg. Co., 18 Murray, N. Y.	2
Rome Iron Works, Rome, N. Y.	2
Scoville Mfg. Co., 421 Broome, N. Y.	2
Waterbury Brass Co., 290 B'way, N. Y.	2
<b>Brass Butt Hinges.</b>	
Tiebout W. & J., 16 & 18 Chambers, N. Y.	28
<b>Brass Foundries.</b>	
Marland Wm., Trenton, N. J.	4
Reynolds Martin, Brooklyn, N. Y.	14
<b>Brass Goods.</b>	
Waterbury Mfg. Co., Waterbury, Conn.	2
<b>Bridge Builders.</b>	
Moseley Iron Bridge & Roof Co., 5 Dea, N. Y.	43
Union Bridge Co., 50 Wall, N. Y.	43
<b>Brushes.</b>	
Brownell Brush & Wire Goods Co., Cincinnati, O.	5
<b>Buckets, Pump and Elevator.</b>	
Iron Clad Mfg. Co., 22 Cliff, N. Y.	52
<b>Builders' Hardware.</b>	
Clark Mfg. Co., Buffalo, N. Y.	42
Nimick & Britton Mfg. Co., Philadelphia, Pa.	42
<b>Butcher and Shoe Knives, Manufacturers of.</b>	
Wilson John, Sheffield, England	10
<b>Bulls and Hinges.</b>	
Smith & Edge Mfg. Co., Bridgeport, Conn.	51
Stanley Works, New Britain, Conn.	38
Union Mfg. Co., 96 Chambers, N. Y.	7
<b>Cau Openers.</b>	
Andrews Thos. J., Philadelphia, Pa.	34
<b>Car Axles.</b>	
Roberts A. & P. & Co., 205 S. 4th, Phila.	5
<b>Carriage Hardware.</b>	
Townsend, Wilson & Hubbard, Phila.	40
<b>Carriage Hardware, Makers of.</b>	
Smith H. D. & Co., Plantville, Conn.	12
Woodruff, Miller & Co., Mount Carmel, Ill.	43
Upson Nat. Co., 96 Chambers, N. Y.	10
<b>Car Wheels.</b>	
Union Foundry & Pullman Car Wheel Works, Chicago, Ill.	30
<b>Casters.</b>	
Payson Mfg. Co., Chicago, Ill.	10
Phoenix Caster Co., Indianapolis, Ind.	41
<b>Castings, Iron.</b>	
S. Cheney & Son, Malina, N. Y.	32
Devlin Thos. & Co., Philadelphia, Pa.	7
Haight & Clark, Albany, N. Y.	39
Hammer & Co., Branford, Conn.	15
North Brothers, Philadelphia, Pa.	5
Syracuse Mfg. Iron Wks., Syracuse, N. Y.	4
Tatum Saml. C. & Co., Cincinnati, O.	28
Wetherill Robt. & Co., Chester, Pa.	51
<b>Castings, Steel.</b>	
Chester Steel Castings Co., 407 Liberty, Philadelphia, Pa.	52
Eureka Cast Steel Co., Chester, Pa.	52
Flag Stanley G. & Co., Philadelphia, Pa.	52
Johnson L. G. & Co., Spuyten Duyvil, N. Y.	58
Kennel, Hempel & Co., Pittsburgh, Pa.	58
Pittsburgh Steel Casting Co., Pittsburgh, Pa.	58
Standard Steel Casting Co., Thurlow, Pa.	6
<b>Chains.</b>	
Bradley & Co., 816 Richmond St., Phila.	5
Wier Foundry & Machine Co., R. I.	40
Lovejoy J. F., 102 Chambers, N. Y.	43
<b>Cheese Saws.</b>	
National Wire & Iron Co., Detroit, Mich.	3
<b>Chemists.</b>	
Haines R., Philadelphia, Pa.	5
<b>Chemicals.</b>	
Elmer & Amend, 205 Third av., N. Y.	45
<b>Cherry Stoppers.</b>	
Enterprise Mfg. Co., Philadelphia, Pa.	46
<b>Chisels, Manufacturers of.</b>	
Buck Bros., Millbury, Mass.	13
<b>Chucks.</b>	
Ives W. A. & Co., New Haven, Conn.	34
Smith & Edge Mfg. Co., Bridgeport, Conn.	51
Specialty Mfg. Co., Cleveland, O.	9
<b>Clock Springs, &amp;c.</b>	
Dunbar Bros., Bristol, Conn.	7
<b>Clothes Dryers.</b>	
Hill Dryer Co., Worcester, Mass.	10
<b>Coal.</b>	
Eaterbrook Wm., Philadelphia, Pa.	13
<b>Coal Vases.</b>	
Pardee A. & Co., 111 Broadway, N. Y.	44
<b>Coal Vases.</b>	
Jewett John C. & Sons, Buffalo, N. Y.	31
<b>Coffee and Spice Mills.</b>	
Enterprise Mfg. Co., Philadelphia, Pa.	46
Lane Bros., Poughkeepsie, N. Y.	43
<b>Coke.</b>	
Schoonmaker J. M., Pittsburgh, Pa.	41
<b>Colters.</b>	
Geo. K. Oyer Mfg. Co., St. Louis, Mo.	46
<b>Compasses &amp; Calipers, Manufacturers.</b>	
Bemis & Call Hardware & Tool Co., Springfield, Mass.	14
Stevens J. & Co., Chicopee Falls, Mass.	43
<b>Copper.</b>	
Brown & Bros., 81 Chambers, N. Y.	2
Quincy Iron Works, 101 Duane, N. Y.	32
Lovejoy John F., 102 Chambers, N. Y.	43
<b>Corrugated Boiler Furnaces.</b>	
Enterprise Mfg. Co., Philadelphia, Pa.	46
Lloyd & Supply Hardware Co., 625 Mar. St., Philadelphia, Pa.	46
Millers Falls Co., 74 Chambers, N. Y.	52
Stanley Works, New Britain, Conn.	38
Union Mfg. Co., 96 Chambers, N. Y.	7
<b>Corrugated Iron.</b>	
Elizabethtown Steam Corrugate Co., 48 South, N. Y.	32
<b>Corner Irons.</b>	
Quincy Floor Plate and Staple Mfg. Co., Quincy, Ill.	32
<b>Corrugated Boiler Furnaces.</b>	
Hartmann, Le Doux & Macker, Cincinnati, Ohio	48
<b>Corrugated Iron.</b>	
Cincinnati Corrugating Co., Cincinnati, Ohio	46
Knealy & Miller, Chicago, Ill.	46
Moseley Iron Bridge & Roof Co., 5 Dea, N. Y.	43
<b>Coverings, Boiler and Pipe.</b>	
Chalmers-Spence Co., 419 Eighth, N. Y.	11
<b>Cresting, Iron.</b>	
Bolles J. E. & Co., Detroit, Mich.	3
<b>Crucibles.</b>	
Seidel R. B., Philadelphia, Pa.	47
<b>Cupolas.</b>	
Collins Furnace Co., Detroit, Mich.	45
Smith & Sayre Mfg. Co., 245 B'way, N. Y.	51
<b>Cutlery, Importers of.</b>	
Alford & Berkele Co., 77 Chambers, N. Y.	31
Butcher W. & S., Sheffield, England	10
Clawthorpe F. & S., 82 Chambers, N. Y.	10
Curry J. & Bro., 131 & 133 Nassau, N. Y.	10
<b>Cutlery, Manufacturers of.</b>	
Bannister A. F. & Co., Newark, N. J.	10
John Russell Cutlery Co., Turner Falls, N. Y.	32
Northfield Knife Co., Northfield, Conn.	32
Vought & Williams, 288 Greenwich, N. Y.	4
<b>Dinner Pail and Lantern.</b>	
Haight Joseph, Port Chester, N. Y.	8
<b>Doors.</b>	
Pope & Stevens, 114 Chambers, N. Y.	38
<b>Door Checks and Springs.</b>	
Shaw Door Check & Spring Co., Boston, Mass.	42
<b>Door Hangers, House and Barn.</b>	
Cronk Hanger Co., Elmira, N. Y.	43
Lane Bros., Poughkeepsie, N. Y.	43
Lovejoy John F., 102 Chambers, N. Y.	43
Moore S. H. & E. Y., Chicago, Ill.	32
<b>Draw Knives.</b>	
A. J. Wilkinson & Co., Boston, Mass.	30
<b>Drill Braces.</b>	
Millers Falls Co., 74 Chambers, N. Y.	52
<b>Drilling Machines, Makers of.</b>	
Peetle's Punch & Shear Co., 38 W. Dea, N. Y.	51
Wiley & Russell Mfg. Co., Greenfield, Mass.	41
<b>Drills.</b>	
Sterling Elliott, Newton, Mass.	13
<b>Drop Forgings.</b>	
Brown R. H. & Co., Westville, Conn.	50
Merrill Bros., 26 First St., Brooklyn, E. D.	13
Lovejoy John F., 102 Chambers, N. Y.	43
Williams J. H. & Co., Brooklyn, N. Y.	40
<b>Eaves Trough Hanger.</b>	
Heartley Geo. W., Toledo, O.	32
<b>Edge Tools, Makers of.</b>	
Doscher M., 85 Chambers, N. Y.	44
White L. & J., Buffalo, N. Y.	43
<b>Elevators, Makers of.</b>	
Clem & Moore, Philadelphia, Pa.	51
Oslo Bros. & Co., 82 and 94 Liberty, N. Y.	42
Stokes & Parrish, Philadelphia, Pa.	50
<b>Emery.</b>	
Walpole Emery Mills, South Walpole, Mass.	28
<b>Engines, Gas.</b>	
Clerk Gas Engine Co., Philadelphia, Pa.	51
National Engine Co., 51 Chambers, N. Y.	45
Schleicher, Schumm & Co., Phila.	51
<b>Engines, Steam, Makers of.</b>	
Bliss E. W., Brooklyn, N. Y.	50
Cooke & Co., 22 Cortlandt, N. Y.	9
Rumsey L. Mfg. Co., St. Louis, Mo.	48
Union Engine Co., Cleveland, O.	48
N. Y. Safety Steam Power Co., 30 Cortlandt, N. Y.	38
The Pusey & Jones Co., Wilmington, Del.	50
The Westinghouse Machine Co., 422 Wetherill Robt. & Co., Chester, Pa.	51
<b>Evaporators.</b>	
Geo. R. Oyer Mfg. Co., St. Louis, Mo.	46
<b>Expanding Mandrels.</b>	
Cooke & Co., 22 Cortlandt, N. Y.	9
<b>Facings, Foundry.</b>	
Emrick J. A. & Co., Philadelphia, Pa.	3
Obermayer S. & Co., Cincinnati, O.	38
Faxon J. W. & Co., 514 Beech, Phila.	5
<b>Farriers' Tools.</b>	
McNab & Harlin Mfg. Co., 30 Gold, N. Y.	40
<b>Faucets, Makers of.</b>	
Enterprise Mfg. Co. of Pa., Phila. & N. Y.	46
<b>Faucets, Self-Measuring, Makers of.</b>	
Hall & Sons, Buffalo, N. Y.	4
<b>Fences, Wrought Iron.</b>	
Mast, Foss & Co., Springfield, O.	38
National Wire and Iron Co., Detroit, Mich.	3
<b>Fencing and Cresting.</b>	
Bolles J. E. & Co., Detroit, Mich.	3
<b>Files and Rasps.</b>	
New Am. File Co., Pawtucket, R. I.	20
<b>Files, Importers of.</b>	
Carr J. & Elley, 30 Gold, N. Y.	44
Moore F. W. 90 John, N. Y.	44
<b>Files, Manufacturers of.</b>	
Barnett O. H., 41 & 43 Richmond, Phila.	8
Robertson James M., Scranton, Pa.	52
Hennel, Christian, Philadelphia, Pa.	8
McCaffrey & Bro., 1722 & 1724 N. 4th, Phila.	8
Nicholson & Co., Providence, R. I.	8
Paul Chas. B., Williamsburg, N. Y.	8
Spencer, Mathias & Sons, Sheffield, Eng.	10
Union File Co., Baltimore, Md.	8
<b>Fire Brick, Makers of.</b>	
Borgner & O'Brien, Philadelphia, Pa.	42
Gardner James, Pittsburgh, Pa.	42
Kreischer & Sons, Foot & Houston, N. Y.	42
McLeod H. S., Troy, N. Y.	42
Newton & Co., Albany, N. Y.	42
Ostrander James & Son, Troy, N. Y.	42
Union Mining Co., Philadelphia, Pa.	42
Valentine M. D. & Bro., Woodbridge, Conn.	42
National Fire Brick Co., Perth Amboy, N. J.	42
Woodbridge Clay Mining & Refining Co., Reading, Pa.	42
<b>Forges, Portable, &amp;c.</b>	
Brace & Co., Buffalo, N. Y.	58
Bullock T. H., Cleveland, O.	5
Empire Portable Forge Co., Cohoes, N. Y.	48
Fairbanks & Co., 311 Broadway, N. Y.	48
Mt. Mfg. Co., Cleveland, O.	49
<b>Forgings, Iron and Steel.</b>	
Pennsylvania Steel Co., Dauphin Co., Pa.	12
<b>Foundry Supplies.</b>	
Emrick J. A. & Co., Philadelphia, Pa.	3
<b>Foundry Clutches.</b>	
Bates H. N., Boston, Mass.	40
<b>Furnace Hoists.</b>	
Stokes & Parrish, Philadelphia, Pa.	50
<b>Furnace Lamps.</b>	
Taylor & Boggs M'ry Co., Cleveland, O.	39
<b>Gates, Folding.</b>	
Composite Iron Wks. Co., 93 Church, N. Y.	3
<b>Glass Cutters.</b>	
Andrews Thos. J., Philadelphia, Pa.	34
<b>Glue.</b>	
Russell Cement Co., Gloucester, Mass.	38
<b>Grate Bars.</b>	
Cresswell David S., Philadelphia, Pa.	51
Rocking Grate Bar Co., Chicago, Ill.	38
<b>Grindstones.</b>	
Dermonit & Berea Stone Co., Cleveland, Ohio	39
Walter R., 283 and 285 Front, N. Y.	39
Worthington & Sons, Cleveland, O.	39
<b>Gunpowder, Makers of.</b>	
Lafin & Rand Powder Co., 29 Murray, N. Y.	8
<b>Hammers.</b>	
Harford Hammer Co., Hartford, Conn.	43
Harvey R. E., Stoughton, Mass.	41
<b>Hammers, Steam.</b>	
Bradley & Co., Syracuse, N. Y.	52
<b>Hand Force Pumps.</b>	
Union Mfg. Co., 96 Chambers, N. Y.	7
<b>Handles (Hammer).</b>	
Muselman & Son, Quakertown, Pa.	7
<b>Hardware Common Merchants.</b>	
Field Alfred & Co., 93 Chambers, N. Y.	10
Graham J. H. & Co., 113 Chambers, N. Y.	8
Haines Samuel A., 88 Chambers, N. Y.	12
Northwestern Hardware Co., Chicago, Ill.	45
<b>Hardware Dealers.</b>	
Lloyd & Supply Hardware Co., 625 Market, Philadelphia, Pa.	46
<b>Hardware Importers.</b>	
Baker Hermann & Co., 101 Duane, N. Y.	32
Field Alfred & Co., 93 Chambers, N. Y.	10
Lovejoy John F., 102 Chambers, N. Y.	43
<b>Hardware Manufacturers.</b>	
Enterprise Mfg. Co., Philadelphia, Pa.	46
Lloyd & Supply Hardware Co., 625 Market, Philadelphia, Pa.	46
Millers Falls Co., 74 Chambers, N. Y.	52
Stanley Works, New Britain, Conn.	38
Union Mfg. Co., 96 Chambers, N. Y.	7
<b>Hardware Specialties.</b>	
Amidon & White, Buffalo, N. Y.	42
Andrews Thos. J., Philadelphia, Pa.	34
Moore S. H. & E. Y., Chicago, Ill.	32
Boz A. & Co., 130 Center, N. Y.	51
Tatum Saml. C. & Co., Cincinnati, O.	28
Underhill, Clinch & Co., 91 Chambers, N. Y.	10
<b>Harness Snaps.</b>	
Covert Mfg. Co., West Troy, N. Y.	39
Walton & Sprout, Newark, N. J.	13
<b>Hay Knives.</b>	
Hiram Holt & Co., East Wilton, Me.	8
<b>Hinges.</b>	
Stanley Works, New Britain, Conn.	38
Union Mfg. Co., 96 Chambers, N. Y.	7
<b>Hoes.</b>	
Brace George W., 1 Platt, N. Y.	9
<b>Hoe Ringers.</b>	
Blair E., Bucyrus, O.	6
Stanley Works, New Britain, Conn.	38
<b>Holding Engines, Makers of.</b>	
Rumsey L. Mfg. Co., St. Louis, Mo.	48
<b>Holding Machines.</b>	
Box Alfred & Co., 314 Green, Phila.	





# Trade Report.

## Philadelphia.

Office of The Iron Age, 290 South Fourth St.,  
PHILADELPHIA, October 7, 1884.

**Pig Iron.**—The market has been in a very lifeless condition since date of our last report, and the hoped-for improvement seems as distant as ever. Small lots are about all that can be placed, and even these are expected to be at lower figures. Holders of Foundry Irons are pretty steady, however, and, as good brands are in limited supply, buyers have no alternative but to pay the prices asked, although, as already stated, only very small lots are taken. Mill Irons are not as firm as other grades, and consumers claim that special rates can be had on lots of 500 tons and upward. This may be so in some cases, but the majority of best-known brands are held with absolute firmness, according to quality, and values fixed by the makers. There are considerable quantities of outside brands, however, some of excellent quality, some of fair quality and some uncertain. It is on this class of Iron that there is so much discrepancy in price, and when \$16 @ \$16.50, delivered, is named for Mill Irons, or \$18.50 @ \$19 for No. 1 Foundry, it does not apply to standard brands, but to what are known as "outside lots." At the same time there is no doubt that they have a depressing tendency on the entire market, and it is this class of competition that has caused the demoralized feeling which so generally prevails. Judging from the limited demand, consumption must be unusually light, and, although production has been cut down considerably, it appears to be sufficient for all requirements. At the moment there is nothing in sight likely to change the monotonous current of events, and about all that sellers seem to hope for is to be able to place their product without further sacrifice in price. Very few are carrying stocks of any account, and in the majority of cases a fair amount of orders are entered for forward delivery, so that sales need not be large to keep clear of the balance of their product. General quotations are same as last week, say \$19.50 @ \$20 for No. 1 Foundry, \$18 @ \$18.50 for No. 2, and \$17 @ \$17.50 for Gray Forge, with higher prices for special qualities, and lower prices in cases such as already mentioned.

**Foreign Iron.**—Nothing doing, and prices altogether nominal. Bessemer at \$19 @ \$19.50; 30% Spiegel at \$32, 20% at \$26.50, and 10% at \$23.

**Blooms.**—The market very dull, and only limited transactions are reported at last week's prices, say: Charcoal Blooms at \$52 @ \$53; Run-out Anthracite, \$43; Scrap Blooms, \$40; Northern Ore Blooms, \$38.

**Muck Bars.**—Market very quiet, and prices barely steady. Good qualities command about \$29 @ \$29.50 at mill, but lower prices have been accepted on large lots.

**Bar Iron.**—There is little to be said except that business is as dull and depressed as ever. There is absolutely no demand for large lots, so that the mills are running on small orders as received from time to time. There is great anxiety among manufacturers to secure a larger share of business, but, as they are all pretty much in the same condition, it is not easy to do it without sacrificing prices. There is no margin for that, however, so that there is practically no change in the position whatever. Best Refined Bars are quoted at from 1.85¢ to 1.9¢, and Medium and Common at from 1.6¢ to 1.75¢, with special rates on large orders.

**Plate and Tank Iron.**—Business has been very quiet during the week, and the mills are getting through their orders with out any immediate prospect of having them replaced. Some are of the opinion that there will be a decided improvement if Ohio be carried by the Republicans, as a large amount of work is held in abeyance until that point is decided. The improvements and extensions referred to will have to be carried out in any event, but the idea is that prices may be lower under Democratic administration; hence the delay. Prices may be quoted same as last week, viz.: Plate Iron, 2.1¢; Tank, 2.15¢ @ 2.25¢; Shell, 2.75¢; Flange, 3.75¢; Fire-Box, 4.25¢; Steel Plates, Flange, 3.5¢; Fire-Box, 4.25¢.

**Structural Iron.**—The demand has been very disappointing during the week, and while some of the leading mills are fairly supplied with orders, others are running very short. Sales during the week have not been equal to deliveries, so that the position is less favorable than it was a week ago. There is a large amount of work in sight, nevertheless, but there is no certainty when it will be given out, so that for the time being the feeling is anything but cheerful. Meanwhile prices remain as last quoted, viz.: 2.1¢ for Angles, 2.25¢ for Bridge Plate, 2.75¢ for T's and 3.5¢ for Beams and Channels, subject to the usual discount on large lots.

**Sheet Iron.**—The demand has been very unsatisfactory during the week, but at the present figures there is no room for lower prices. The best qualities are therefore steadily held at former quotations, which for small lots are about as follows:  
Best Bloom Sheets, Nos. 26 to 28, ..... 64¢  
Best Bloom Sheets, Nos. 16 to 21, ..... 53¢  
Common Red Plates, 3-16 to 16, ..... 52¢  
Blue Annealed, ..... 52¢  
Best Bloom, Galvanized, discount, ..... 50¢  
Second quality, discount, ..... 52 1/2¢  
Common, discount, ..... 57 1/2¢

Best Bloom Sheets, Nos. 26 to 28, ..... 64¢  
Best Bloom Sheets, Nos. 16 to 21, ..... 53¢  
Common Red Plates, 3-16 to 16, ..... 52¢  
Blue Annealed, ..... 52¢  
Best Bloom, Galvanized, discount, ..... 50¢  
Second quality, discount, ..... 52 1/2¢  
Common, discount, ..... 57 1/2¢

**Wrought-Iron Pipe.**—There is a fair demand from those who have building contracts and steam-heating contracts to fill before cold weather sets in, but there is no position to buy more than is needed at once. Buyers, in a measure, fix prices to suit themselves, and scarcely two orders are taken at the same figure. We quote discounts nominally as before, viz.: But Welded Black Pipe, 45%; Butt-Welded Galvanized, 35%; Lap-Welded Black, 60%; Galvanized, 45%; Boiler Tubes, 57 1/2%.

**Steel Rails.**—The market has shown a steadily hardening tendency, and prices have averaged pretty nearly \$1 1/2 ton more than during the week previous. One reason for the advance is that the mills have taken nearly all the orders they can handle during the winter months; and another, that Rails have cost more than was obtained for them during the past two or three months. Manufacturers are therefore quite indifferent about selling unless they can realize better figures—say \$29 @ \$30 at mill, although there is reason to believe that sales recently made were at from \$28 to \$28.50. Prices are firmer, however, and in ordinary cases \$29 would probably be an inside figure, and a trifle more on small lots.

**Steel Blooms.**—Prices vary according to quality required. There is considerable inquiry for sample lots, for which quotations are about as follows: Nail Blooms (Foreign), \$35 at tide; Soft Basic Blooms, for special uses, \$38 @ \$40. Domestic Slabs, \$36.50 @ \$37.50, delivered.

**Old Rails.**—There is but little change to report, and very few sales have been made of late. Extra good qualities might bring \$18.50 @ \$19, spot, but buyers are not disposed to pay within \$1 1/2 ton of these figures for such lots as are immediately available. A lot for shipment from a Southern port was sold at equal to \$18, Philadelphia, and several lots at interior points brought \$18.50 @ \$19.

**Scrap Iron.**—The demand is very limited and prices somewhat irregular, as follows: Selected No. 1, \$19.50 @ \$20, f.o.b. cars; cargo lots, \$17.50 @ \$18. Machinery Scrap and Wrought Turnings held at \$15 @ \$15.50, and Cast Turnings at \$9 @ \$10.

**Nails.**—The demand keeps up fairly, but there is no firmness to prices. Steel Nails continue to influence the market, and are selling at a trifle more than Iron, and in some cases at the same price; \$2.10 @ \$2.20 is generally obtained, with possibly a few cents less in exceptional cases.

## Pittsburgh.

Office of The Iron Age, 77 Fourth Avenue,  
PITTSBURGH, PA., October 7, 1884.

There has been considerable excitement the past week in politics, Grand Army and labor circles, but general business does not improve; on the contrary, trade in general is in a most unsatisfactory and unsettled condition, and the prospect for an improvement is by no means encouraging. A couple of prominent Iron firms—Oliver Bros. & Phillips and Dilworth, Porter & Co.—asked their common laborers to accept a reduction in wages of from 10 to 12 1/2%. This, as might be expected, created a feeling of great dissatisfaction in labor circles, where it was regarded as an act of oppression. The Amalgamated Association protects the skilled workmen, but takes no cognizance of the laboring men, who are not organized and are unable, therefore, to resist the demands of their employers. It is admitted on all hands that the Iron business in all its varied departments is in an exceedingly depressed and unsettled condition, but it seems hard that the pitance paid the laboring men has to be reduced. They are now receiving from \$1.12 1/2 to \$1.25 per day, so that it can be readily seen how hard this reduction would bear upon them. The firms in question say that it is a matter of necessity; that in order to successfully meet competition they must make a reduction in the cost of production, and the laboring man is the only one they can reach. The men held a meeting and refused to accept the reduction, and both mills have been closed, throwing some 3000 men out of employment. This is to be regretted, but it is thought that the shut-down will be of short duration.

**Iron Ore.**—The situation here remains unchanged; consumption continues exceedingly light, and is more likely to be reduced than increased, as the few furnaces hereabout in blast threaten to shut down as soon as they get through with existing contracts unless there is an improvement in the meantime, of which there is but little prospect at present. It is pretty evident that there will not be much change for the better during the remainder of the present year, as many of the idle furnaces will refuse to buy until they are about ready to blow in. In the meantime stocks of Ore at the lake ports are large and increasing.

**Pig Iron.**—Business continues light, but all that can be expected in view of the depressed condition of the general Iron trade. Furnacemen, as might be expected, are very much discouraged, and the indications are that the number of idle furnaces will be

increased between now and the close of the year. This prediction is based upon the principle that it is better to do nothing than to work for nothing. There has been little or no change in prices for several weeks; of course there are off lots that can be obtained at almost any price, but well-known brands of both Mill and Foundry are held with considerable tenacity, and consumers generally prefer to pay the difference for the latter, on the principle that a good article is always the cheapest in the end. It is worthy of mention, by way of encouragement to the selling interest, that, in addition to a steady falling off in production, stocks are light, both in first and second hands; consumers, as a rule, have little or no stock, as they have been buying along as their immediate actual necessities required for several months past. We repeat former quotations:

Neutral Mill, ..... \$16.00 @ \$16.50, 4 mos.  
All-Ore Mill, ..... 17.50 @ 18.00, 4 "  
White and Notified, ..... 15.00 @ 15.50, 4 "  
Silver Iron, ..... 17.50 @ 18.50, 4 "  
No. 1 Foundry, ..... 19.00 @ 20.00, 4 "  
No. 2 Foundry, ..... 17.00 @ 18.00, 4 "  
Cold-Blast, Charcoal, ..... 25.00 @ 27.00, 4 "  
Bessemer Iron, ..... 18.50 @ 19.00, 4 "

Included in the sales of Mill Iron the past week was a lot of 1000 tons made from native Ore, at \$16, four months, and a couple of small sales of Bessemer—one at \$18.75, four months, and the other at \$18 7/8, cash.

**Muck Bar.**—The dullness noted for some time past continues, and in the absence of sales we repeat former quotations—\$28 @ \$29, cash.

**Manufactured Iron.**—Mill owners almost without exception continue to report trade as being very dull; that, in addition to a very light demand, prices are so low that it is about all the manufacturer can do to get actual cost for his products. Prices are still quoted here on a basis of 1.65¢ @ 1.75¢ for Bars, 60 days, 2% off for cash, but reports come from Chicago, St. Louis and other points of distribution West that purchases are made at prices considerably below those above quoted.

**Nails.**—There has been no material change in the situation during the past week; while there is a fair business in the aggregate, orders are mostly small, and it is evident that jobbers are still apprehensive of lower prices, although there has been no decline during the past few weeks. We continue to quote at \$2, 60 days, 2% off for cash, in car lots, and 5¢ @ 10¢ per keg additional in a jobbing way. Steel Nails 15¢ per keg more than Iron Nails. As stated in our last, Shoenberger & Co. have commenced to make Steel Nails, and it is understood that Zug & Co. will do likewise as soon as they can get their arrangements perfected. It looks as if the Steel Nail was about to go into general use, and that the Iron Nail, like the Iron Rail, will soon be a thing of the past.

**Wrought-Iron Pipe.**—The demand is not as good as it was a few weeks ago, and, while the mills appear to be pretty well employed at present, the outlook for the future is not as promising as it might be. Prices continue irregular and unsatisfactory, and for large, desirable orders lower rates than those quoted are, it is said, being accepted. A meeting of manufacturers will, it is understood, be called shortly for the purpose of adopting a new list. Discount on Black Butt-Welded Pipe, 40%; do., Galvanized, 30%; on Black Lap-Welded Pipe, 60%; do., Galvanized do., 40%. Discounts on Boiler Tubes, 52 1/2 @ 57 1/2%. Two-inch Oil-Well Tubing, 12¢ per foot, net; 5 1/2-inch Oil-Well Casing, 40¢ per foot. For Selected Pipe or Pipe cut to special lengths discount 5% less than the rates quoted.

**Steel Rails.**—Are firmer, and we now quote at \$28 @ \$29, cash, at mill. It is claimed that there have been no sales made here below \$28, and \$29 is now the asking price, although it is probable that a desirable order for near-by delivery could still be placed at \$28.

**Old Iron Rails.**—The market here continues very dull, and in the absence of sales we repeat former quotations, viz., \$19.50 @ \$20.

**Railway Track Supplies.**—There is so little doing that it is difficult to give reliable quotations. The combination price for Spikes remains unchanged at 2.35¢, 30 days, but they can be bought for considerably less.

**Crop Ends.**—American have been sold as low as \$17.50, cash; may be quoted at \$17.50 @ \$18.

**Steel.**—Steel Slabs for making Steel Rails are becoming quite an item in the Steel trade, and some of the mills are giving this branch considerable attention; we hear of one sale of 1000 tons and another of 300, quoted at \$31 @ \$32 per ton. Best brands of Refined Cast Steel remain unchanged at 9 1/2¢ @ 10¢; do. Crucible Machinery, 5¢; Open-Hearth and Bessemer do., 3¢.

**Scrap.**—The Scrap trade continues exceedingly dull, and there is so little doing that it is difficult to give reliable quotations: No. 1 Wrought is nominal at \$18 @ \$19 per net ton; Wrought Turnings, \$14 @ \$15; Old Car Axles, \$25 @ \$26; Cast Borings, \$12 @ \$12.50, gross; Old Car Wheels, \$16.50 @ \$17, gross.

**Window Glass.**—A fair business is reported, but prices are unsatisfactory. Discounts are quoted at 70 and 5% on Single and 75% on Double in car lots and upward.

**Coke.**—Trade continues dull; combination price remains unchanged at \$1.10 per ton on cars at ovens.

## Chicago.

Office of The Iron Age, 36 and 38 Clark St.,  
COR. LAKE ST., CHICAGO, October 6, 1884.

**Hardware.**—There is no change in the condition of the Hardware market. Orders are plentiful and of no mean proportions. Jobbers are several days behind in supplying the demand, which is somewhat in advance of what it was for a similar period a year ago. As the season progresses more cutting in price on some lines of goods becomes apparent. In Tin Plate a reduction of 50¢ has been made. Sheet Zinc has been reduced from 6¢ to 5 1/2¢, and manufactured goods are correspondingly weak. The liberal instructions to salesmen for wholesale jobbing houses (in order to hold old customers)—to "meet reductions of competing houses"—are in part to blame for some of the recent low prices. New price lists have been issued by some of the houses, which reduce the price on certain lines. Other jobbers follow in the wake and "go one better" on their list, until the margin is lost to the jobber and his goods are being sold at cost. Prices that are thus shaken are necessarily weak and cannot be relied on.

**Barb Wire.**—The demand for Barb Wire is only fair, and principally in small lots. The effort on the part of manufacturers to form a syndicate and establish a price higher than present quotations has thus far been unsuccessful. Another meeting will be held next week to further consider the subject. For car lots Galvanized Wire is quoted at 5 1/2¢ and Painted at 4 1/2¢. Notwithstanding the statements that their prices are lower than the Wire can be made for, the new Barbed Wire company at Joliet, Ill., expect to be in operation before the close of the month. It is said that they claim advantages which will enable them to make Wire at 20% less than present prices.

**Nails.**—The demand for Nails during the week past has been largely for 10 to 50 keg lots. In lots of this size Wheeling and Pittsburgh Nails are quoted at \$2.20, and car lots at \$2.15, 2%, 60 days. The demand for car lots has dwindled to almost nothing, and, when such orders are open for quotations, shading to the extent of 5¢ is always expected. One lot of considerable size was offered at \$2.10, 2%, by a mill which is carrying more than its usual amount, without being accepted. The aggregate sales make a fairly active demand when the conditions of the market are considered.

**American Pig Iron.**—The strength of the Pig Iron market here seems to have had its effect on districts remote from this city. Letters from makers announcing higher prices are being received, and the general tone has an upward tendency. Particularly is this true of Southern Irons. Makers have evidently become tired of the low and unprofitable business of the past six months. But obtaining higher prices is a much slower and more difficult operation than reducing them. The market is undoubtedly stronger than a month or six weeks ago. Offers then made are withdrawn, and sales made at the lowest points are not duplicated. Furnaces are not contracting for more than 60 to 90 days' advance sales, as a rule; others for immediate delivery only. But when we come to write prices higher than our quotations which have been obtained on the same brands of Iron, we cannot find them. So much selling has heretofore been done on private terms, or at figures which, from surrounding circumstances, could not be regarded as a market price, that there has thus far been sufficient margin below quotations to meet the strength of the market. Quotations that some time ago were the prices for almost any buyer are now bottom for the best trade. The market is firm and apparently so well cleaned of old lots that there is a fair chance for better prices, with an additional improvement in general business. During the week 25¢ has stood between sellers and buyers and deferred sales of some 3000 tons of Lake Superior Charcoal Irons. For present delivery we continue the following quotations on carload lots, four months: Lake Superior Charcoal, Nos. 1, 2 and 3, \$21.50; Nos. 4, 5 and 6 at \$22; Lake Superior Coke at \$20; Lake Superior and Ohio, mixed, at \$20 @ \$21; Ohio Standard Black Band, No. 1, at \$21; Southern, No. 1, at \$18; No. 2 at \$17.50; Silvery Soft at \$17.50 @ \$19.50; Anthracite, No. 1, at \$21, and No. 2 at \$20.

**Scotch Iron.**—We have nothing of importance to note in the conditions of the market for Foreign Iron. Buying of small lots constitutes all the trade, which is light and irregular. We quote as follows: Summerlee, \$25.50, cash, from yard, and \$24.50 to arrive; Glengarnock, \$25.50 from yard, and \$24 to arrive.

**Merchant Steel.**—Some improvement is reported in the demand for Steel among the makers of the best brands of Tool and Machinery grades. A few inquiries for Tool Calk are also reported, but light selling, the season being a little early. The market offers no inducement to buy beyond what is necessary for immediate use. Prices are weak and irregular, and cutting continues. For Refined grades from store we make the following quotations:

Per pound.  
Best Refined Cast Tool Steel, ..... 8 1/2 @ 10¢  
Crucible Cast Machinery Steel, ..... 6 @ 6 1/2¢  
Open-Hearth and Bessemer Steel, ..... 5 @ 5 1/2¢  
Open-Hearth Spring Steel, ..... 8 1/4 @ 8 1/2¢  
Tool-Calk Steel, ..... 8 1/4 @ 8 1/2¢  
Fire-Box and Boiler Steel, ..... 4 1/2 @ 5¢  
Syndicate Steel, ..... 7 @ 7 1/2¢

**Steel Rails.**—The market for Steel Rails has been very quiet during the week. Makers have neither inquiries nor sales to

report. The popular quotation in this market is \$30 per ton, though it has been inferred that less would be accepted by one of the mills rather than lose an order when in need of work.

**Old Rails.**—The market for Old Rails is pretty firm, and the most of the marketable stock in strong hands. One lot of 1000 tons was sold during the week at a distant point, equal to \$18.50, Chicago, on a low freight rate. Quotations by mills are from \$18 to \$19, which are not acceptable to holders, who are asking about \$1 1/2 ton more.

**Structural Iron.**—Several large structures which are contemplated in and out of the city have given new life to the builders' Iron market. Most of the mills are on the verge of idleness, and competition for the trade in prospect is quite strong. Indications are that, if the weather permits, there will be more building in this city during the coming winter than was looked for, and makers of Beams and Channels are accordingly revived. We continue following quotations, with 1/4¢ @ 1/2¢ added for delivery from stock: Beams, \$3.60; Channels, \$3.60; T Iron, \$3; Angle Iron, \$2.50; Flitch Plates, \$2.50; Frieze Plates, \$2.70.

**Bar Iron.**—The demand for Bar Iron is steady and fairly active. There is perhaps less advance buying than several weeks ago, but consumption throughout the country is from appearance as strong as at any time during the year. The aggregate sales amount to something less in dollars, because some of the Iron goes out on contracts made by Implement manufacturers whose purchases have already been added to the amount of sales, but the tonnage is equal to any time in the past. Best Refined New Puddled Iron is quoted from store at \$1.85 @ \$1.90. Common Iron is weak in price from mill, and from store is quoted at \$1.70 @ \$1.80. Ulster Iron is quoted at \$3.65 @ \$3.75.

**Norway Bars.**—During the week there has been a fair market for Imported Bars. Merchant price is \$3.75, as before, and consumers 4¢ rates. Heavy buyers who are consumers can, perhaps, shade this price a tenth.

**Galvanized Iron.**—The Galvanized Iron market and the syndicate are considerably disturbed by the recent break in prices. More trouble has in part been anticipated, but to determine exactly from whom it comes does not prove to be an easy task. Makers who are not in the pool are inclined to secure trade at the expense of prices prevailing for some time back, and, at the same time, are unwilling to enter the combination. Trade has not been very brisk with some of late, and work at less profit seems preferable to idleness; besides, it further introduces their Iron, which may not be so well known as some other brands. There is no change in quotations since last week, which are as follows: Juniata, 55% off; Charcoal, 57% off, and Refined, 60% off.

**Black Sheets.**—The Black-Sheet market has been fairly active during the week, as reported by makers. Buying has been largely in small lots, on which mills claim that they are realizing better prices than several months ago. Jobbers are on the bear side and report trade dull in large lots, and for Light Sheets active in small lots. As the principal part of the buying by consumers is from jobbers, we give an open quotation of the price that they are selling at. For some time back there has been a local distraction in prices on Black Sheet between jobbers, which has been the means of placing the Iron within the reach of consumers at as low as, if not less than, wholesale figures at the mill. We quote as follows from store: Nos. 10 to 14 at \$2.60 @ \$2.70; No. 24 at \$2.80; Nos. 25 and 26 at \$2.90, and No. 27 at \$3.

**Old Wheels.**—The market for Old Wheels is reported quiet and firm. There are intimations that Old Wheels are scarce and none offering, and at the same time that there is no demand. Foundries are bidding \$16.50 @ \$17, which makes only a nominal value in the absence of sales.

**Scrap Iron.**—The Scrap market is the same as last week. We hear of some inquiry for Steel Scrap, but nothing of importance in other grades. Mills are quoting \$15 @ \$16.50 for No. 1, and \$11 for No. 2. We make the following quotations as dealers' purchasing prices: No. 1 Wrought Scrap, per net ton, \$14.50; Cast Scrap, per net ton, \$12; No. 1 Stove-Plate Scrap, per net ton, \$8; Wrought Turnings, per ton, \$8; Cast-Iron Borings, \$6; Old Plow Steel, \$9; Tool Steel, per ton, \$15; Locomotive Steel Tire, per net ton, \$13; Buggy Springs, per net ton, \$14.50; Malleable Scrap, \$5.

EVERETT & POST, 156 Lake street, Chicago, report to us as follows, under date of October 6, 1884: Pig Lead—This market has ruled very quiet, though firm, during past week at \$3.60, and sales of some 700 tons Common and Refined to local consumers are reported. The offerings are not large, but enough to supply all present requirements, trade being only of a jobbing character. The statistical position of Lead would point to a maintenance of present prices, but all depends upon consumptive demand.

## Chattanooga.

Office of The Iron Age, Carter and Ninth Sts.,  
CHATTANOOGA, October 6, 1884.

The weather during the week has been very hot, extremely so for the season, and this has a very depressing effect on outside operations. It has also shut down on sales

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The communication which we print below is from a well-known and long-established New England manufacturer. The trade will read with interest the views which he presents as to certain causes of the unsettled condition of prices as they are constantly operating, and will also give to his suggestion—that there be a conference or congress of manufacturers to consider measures to lessen existing difficulties and prevent things remaining wild—the weight to which it is entitled:

To the Editor of the Iron Age: Probably there is no paper published that I read with more care and interest than *The Iron Age*. Have been quite interested in the letters and comments in regard to the cutting of prices. I have been in business about 46 years, continuously in the same business. During this time we have passed through very many periods of depression—some longer and some shorter. Always during a depression prices will settle, and the cutting many times is fearful. Is there any help for it? This is the important question. Under the present system of doing business I must confess I see none. I know of no law to prevent a man or men (sane) buying goods or starting a manufactory from peddling out his money till it is all gone. As a rule, men start business with too small capital, depending on borrowing money. When times are good there is no trouble; but when business is dull and depressed and continues about five years, then comes cutting. Most men in business have bills payable coming due, and they will sacrifice on their goods to meet them. All manufacturers know that there are parties in trade in many of our large places who always have large means at their command and are ready for just such cases. They will always buy when they know the price is under the market. It is impossible for some to keep out of their clutches. This cuts the price, and others must follow or lose trade.

Bank men have wonderful wisdom. They call a man good when he pays his notes, no matter if the man sells goods at 50 per cent. less than they cost to do it. With them he is all right and his credit good at the bank. If the man has property \$10 to \$1 and don't pay, with so-called sharp bankers he has no credit. Hence failures. The time was in the early part of our business life a much longer credit was given than since the war. Nothing less than six months, and at the South one year, was common. Whether the present generation are wiser than those of 30 years ago, I won't undertake to say. The years that manufacturers make money are few compared with those they just hold their own or lose money. One of the most serious things we have had to contend with in our business life is new parties starting in business, who have some money, but no experience. It takes about five years for such parties to find out that they are losing money. Perhaps by that time their money is all gone. They have been kept going by cutting under those who have been longer in the business. If the party happens to have any money left, and concludes to go on in the business, he does so with some knowledge of what it cost to make goods. But about this time another starts up and goes through the same operation. Now, can there be any way devised to lessen all these difficulties, and to prevent in a measure things "running wild." All manufacturers in every line have some things in common. Other interests have a national interest, and have their national congress or convention. The manufacturing business of this country is of large importance. It would seem that the combined wisdom of representative men in all lines of goods manufactured might conceive of some way to lessen the difficulties for which at present there seem to be no help. I throw out this suggestion for thought.

The next letter is from a merchant who finds that the root of the trouble is in the methods which the manufacturers adopt in marketing their goods, specifying the practice of giving to large jobbers a very wide margin, and suggesting, as several of our other correspondents have done, that there be a difference of only 10 per cent. between the prices to the large and the small trade. It will be perceived, also, that his suggestion is that both prices be published openly, so that all would know just what the real prices are. Our correspondent also alludes, it will be observed, to the practice of some manufacturers selling to the merchant's customers at about the same figures that are given to him. But we give the whole letter for the perusal of our readers:

To the Editor of the Iron Age: I have read with interest your comments and various ideas of others with regard to cutting prices, and find the same complaint all over the country. I confess I am unable to see any way out of the difficulty, but wish something might be done to remedy the evil. My experience of more than 20 years convinces me nearly or all the trouble lies with the manufacturers, and if they would consent to do so, could remedy the evil, if not entirely blot it out. Let them say to all parties, our prices are (whatever they see fit to put on their goods), and no deviation in any instance, up to a very large amount, and then only, say, a difference of 10 per cent., and let price and discount be published openly, so any and all could know just what goods were worth or could be bought for cash. In that way it seems to me there would be none of this side talk of 5 or 10 per cent. better, and the middlemen would be done away with. These are only my views, for which I charge nothing. One source of annoyance to the retailer more especially is, trade becomes dull, customers are slow to buy, and the parties for whom he may be selling a certain line of goods think he is not doing as much as he might, and the manufacturer himself goes directly to his agent's customers and supplies the same goods at the same price the dealer has been paying for them. In other words, the manufacturer appoints his agents in certain localities and supplies them with what stock they may need, and after a little slyly goes directly to his agent's customers with same goods and prices. Since this last disturbance in prices I have experienced

three such cases, and I cannot believe I am the only one who has been thus favored. In the face of such facts how can prices be maintained? Manufacturers of that kind should receive the scorn and contempt from every business man which they richly deserve. Until manufacturers maintain prices and protect the dealer we shall never see our way clear to stop this practice of cutting prices.

The following letter touches a point to which little, if any, reference has been made in this discussion, and suggests the old question as to what constitutes a jobber, entitling him to the jobber's discount:

To the Editor of the Iron Age: I have been reading considerable about cutting prices, but your correspondents do not appear to get at the bottom yet. The very worst feature of business is the practice of giving special discounts, or jobbers' discounts, on small lots of almost all shelf goods. It has got so that a wholesale house with one man on the road can get jobbers' prices, and almost every town in this section with a population of 3000 inhabitants, and some even smaller, have one or two "wholesale houses," although most of them say they cannot do more in that way than pay expenses. I have asked several of them why they tried to wholesale if they cannot make it pay. Their answer is that they have the advantage in the retail trade, which means that if they cannot make their expenses on the road they can sell for less at retail than the retailer. Some openly brag about their advantage in this way, and say they can and will retail their goods for less money than those who are not doing a wholesale business. All the "small town wholesalers" make a regular business of retailing, and would not try to wholesale if it was not for getting advantage of other retailers, and they cut and slash and try to run everybody else out. It does not take a very smart salesman on the road to sell \$500 worth of Locks, one carload of Nails or Glass, and almost any other line of goods, thus enabling them to get jobbers' rates. I think this is the greatest cause of cutting, as the heavy discounts on such small lots would drive out the retailer dealer in the town where they have a "wholesale" and retail hardware house. A jobber ought to attend to the jobbing trade and let retailing alone. Extra discounts should be for lots large enough to cut off these retail houses that sell so few goods at wholesale, who have only one or two men on the road, peddling among country dry-goods stores and corner groceries, where they keep a line of everything. The manufacturers cannot, in my opinion, stop the cutting as long as this kind of wholesaling goes on, and yet nearly all that have written on this subject find fault with the jobbers or manufacturers, and say nothing about the "country jobbers" who are trying to cut the retailers' throats, which is where the worst trouble lies.

### New York Iron Market.

In most lines there is a dearth of business. The number of transactions is exceedingly limited, and many merchants and agents are scarcely doing more than paying running expenses. Some of those who usually manage to obtain a fair amount of patronage report their inability to secure any orders whatever, their efforts to induce purchases being met with the response from every direction that buyers at present do not feel like laying in any stock. This is particularly the case with those who deal in crude material, such as Pig Iron, Old Rails, Scrap Iron, &c., the Manufactured-Iron trade showing somewhat better results. The dullness in business seems to be intensified by the approach of the Presidential election, which is now undoubtedly exerting its greatest influence. Many persons believe that after the election is over trade will brighten somewhat, while others take a gloomy view of the situation and do not anticipate any greater movement in trade until next spring. The general impression prevails that the stagnation in business is now greater than it was in 1877 and 1878.

**American Pig.**—Orders continue to be very few, and small lots are the rule. Few inquiries are reported from consumers, the trade now being done consisting very largely of orders that are solicited. We continue to hear reports of inroads made by Western and Southern Pig Iron on the regular trade of the Eastern section of the country, well-informed parties asserting that these outside Irons are now taking from one-half to two-thirds of the business in many New England cities and towns. Even in this vicinity the quantity of Southern and Western Irons used is quite considerable in proportion to the total quantity of Pig Iron consumed. Of course there are some Eastern companies whose product is regarded with some favor that it is preferred by many foundrymen, but it is a question as to the strength of this sentiment if there is a wide difference in prices. Our monthly report of the number of furnaces in and out of blast shows a slight increase in production in the district contiguous to this city, which is due to more activity in the Lehigh Valley, other sections continuing to show a falling off. The following table exhibits the condition of the furnaces in the territory referred to on the 1st of each month mentioned:

Districts.	No. in blast.			Weekly capacity.		
	Aug.	Sept.	Oct.	Aug.	Sept.	Oct.
New York.	15	12	11	4,000	2,940	2,885
New Jersey.	3	3	3	940	940	790
Lehigh Val.	24	22	24	7,345	6,745	7,875
Schl. Val.	18	17	16	4,775	3,975	3,880
Total....	60	54	54	17,150	14,600	15,410

Standard brands of Lehigh and North River Pig Iron continue to be quoted as follows, tidewater delivery: No. 1 X Foundry, \$19.50 @ \$20.50, a few special brands commanding \$21; No. 2 X Foundry, \$18 @ \$19; Gray Forge, \$17 @ \$18. Outside brands, about

\$1 cheaper. In this market No. 2 X Foundry continues to be weak, in consequence of the very ample supply.

**Scotch Pig.**—The arrivals of the week aggregated about 1200 tons, most of which had been sold to arrive. There is no change in the attitude of buyers, who still seem to be indifferent about laying in stocks. Prices are held about as reported last week, notwithstanding the fact that foreign advices represent makers' prices firmer, with an advancing tendency. It would be difficult to establish an advance here unless the price of American Pig Iron were to advance at the same time. We continue to quote as follows for small lots: Coltness, \$22 @ \$22.50; Gartsherrie, \$21 to arrive, \$22 from yard; Shotts, \$21.50 @ \$21.75 to arrive, \$22 from yard; Langloan, \$21.50 to arrive, \$22 from yard; Carnbroe, \$20.50 to arrive, \$21.25 from yard; Glengarnock, \$20.50 to arrive; Summerlee, \$21 to arrive; Dalmellington, \$20 to arrive; Eglington, \$19.25 @ \$19.50 to arrive; Clyde, \$20 to arrive.

**Bessemer Pig and Spiegeleisen.**—Foreign Bessemer continues to be quoted at \$18.50 and \$19 for shipment, but business is completely stagnant, not even an inquiry being reported. In Spiegeleisen there is nothing new to report, 20¢ being quoted at \$26.50 by some parties, though others are asking \$27.50.

**Bar Iron.**—A slightly increased movement is reported under this head, quite a number of orders for mill lots having been placed. Prices continue to be demoralized, but it is asserted that the lowest rates named for Best Refined Bars apply to Irons made with a mixture of Old Rails or Scrap with Muck Bar. Store trade is perhaps a little more animated, the change over last month being in the direction of better business, though trade cannot yet be reported brisk. Quotations are about as follows: Best Refined, at mill, 1.7¢ @ 2¢; from store, 2¢ @ 2.2¢; Common Iron, at mill, 1.5¢ @ 1.7¢; from store, 1.9¢ @ 2¢.

**Structural and Shaped Iron.**—Some little business has taken place in Angles and Beams, but orders for large lots are very scarce. The general aspect of the trade remains about as reported last week. Quotations for small lots are as follows: Angles, from store, 2.3¢ @ 2.6¢; Tees, from store, 2.9¢ @ 3¢; Beams and Channels, on dock, 3.5¢.

**Plates.**—There is a better feeling noted, though business is not active in this line. The demand for Iron Plates is still light, and even Steel Plates are not in as good request as has been the case for some time. Quotations range about as follows for small lots of Iron Plates: Common or Tank, 2¼¢ @ 2.3¢; Refined, 2½¢; Shell, 2¾¢; Flange, 3¼¢; Extra Flange, 4¢ @ 4¼¢. Quotations for Steel Plates are as follows: Tank, 3¼¢ @ 4¢; Boiler, 4¼¢ @ 5¼¢. These quotations are shaded to best buyers.

**Sheet Iron.**—There is a good, fair demand in a retail way. We have now reached a time which is practically between seasons, the consumers who ordered some time ago and have since been working up their stocks not yet having come into the market for what may be called the second demand, which depends very considerably upon the weather. If cool weather were soon to set in, business would undoubtedly be better. Prices of Black Iron continue about as they have been reported, but Galvanized Sheets range as follows: "C H B," 52½¢ discount; Charcoal, 55¢ discount; Refined, 57½¢ discount for small lots of a few bundles. Good-sized orders can be placed at about 2½¢ better than these figures, while carload lots can be placed at about 5¢ better. Store prices will be found in our list of New York Wholesale Prices.

**Merchant Steel.**—The demand is moderate in a general way, though here and there an order is placed for a fair-sized lot. Quotations for small lots are about as follows: American Tool Steel, 9½¢; Tool Steel of special grades and finer quality, 12¢ @ 20¢; Crucible Machinery, 5¢ @ 6¢; Spring and Tire, 3¢ @ 3¼¢; Open-hearth Machinery, 3¢ @ 3¼¢; Bessemer Machinery, 3¢; English Tool, 14½¢ @ 15¢.

**Steel Rails.**—The sales of the week, so far as reported, have been very light, and inquiries are limited in their number and usually for small quantities. Prices are somewhat higher than they have been, but it is difficult to say what rate would be fixed if a desirable order were to be thrown upon the market. It is understood that most of the mills now have from four to six months' work at their present rate of running. Most of them are working only half-time, while some are barely up to that standard. There is a disposition on the part of the mills to curtail production for a time, a movement being on foot to run only on the day turn for the first six months of 1885. This project has been regarded with favor by nearly all the manufacturers, and the prospects for its adoption are rather bright at present. The advance in prices to which we have referred is not the result of this proposed restriction of production, but is really brought about by the better position the mills are now in for the winter. Some companies are asking \$29 @ \$30 at mill. One or two of them, however, seem willing to take orders at \$28 @ \$28.50. We therefore quote \$28 @ \$30 at Eastern mills.

**Steel-Wire Rods.**—No business of importance is reported, and quotations continue nominally from \$45 up, according to time of delivery. Large lots could possibly be purchased at less.

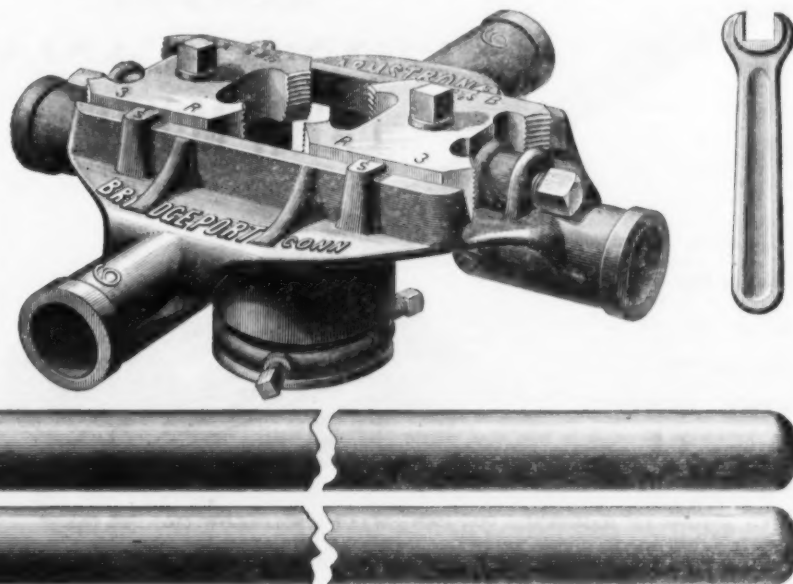
**Iron-Wire Rods.**—Inquiries are in the market for German Coke Rods, which are quoted at \$52 @ \$55, according to quality and size of order. Small lots only are asked for.

**Old Rails.**—The only transaction reported in this vicinity is one of about 100 tons of Old T's on private terms. It is reported that there is a better demand in the West for Old Rails, especially Old American Rails, which are quoted slightly higher at Western points. Quotations in this vicinity range from \$17 to \$18, according to the position of buyer and seller and the quantity and quality of the Rails.

**Scrap Iron.**—A cargo of 600 tons of Scrap Iron from South America was sold on private terms to a dealer. A 100-ton lot of Old American Horse Shoes brought \$25, and a 100-ton lot of Old Fish Plates was sold at \$20, f.o.b. Jersey City. The demand for No. 1 Wrought Scrap from yard is quite light, only one or two small transactions being reported. Prices range from \$19 to \$20, according to location of the yard.

### Coal.

In the Anthracite Coal trade signs are a little better as concerns the wholesale dealers. Business is picking up a little, and the specials are becoming scarce as a result of the recent stoppage. Prices are spoken of as a little firmer, but quotations are unchanged, viz.: Stove, \$3.75 @ \$3.90, although sales have



The Armstrong Stocks and Dies.

been made as low as \$3.50; Chestnut, \$3.40 @ \$3.65; Pea, \$2.50, all f.o.b. in New York. There is talk of another suspension of mining, to take effect soon, perhaps next week, but nothing has been agreed upon. The manufacturing demand in Eastern Pennsylvania is said to be light, mills and furnaces buying sparingly.

Bituminous Coal is also said to be a shade better, but in some quarters this is denied. The general tone is dull. Cumberland and classified are quoted \$3 @ \$3.50, and freights are proportionately low, so that it may be truly said, "the Steam Coal trade is in a bad way for the producer and carrier," and doubtless prices are "far below the relative value of Hard Coal."

The total amount of Anthracite mined thus far in the year 1884 is 21,261,851 tons, compared with 22,632,749 tons for the same period last year. The total amount of Bituminous sent to the Eastern markets thus far in the year 1884 is 4,019,446 tons, compared with 3,672,405 tons for the corresponding period last year—an increase of 347,041 tons.

**Sailing Ships vs. Steamers.**—There is a tendency at present, observes one of our English exchanges, to supplement the mercantile marine with many new sailing ships. It was thought that the class would, with the introduction of steam tonnage, have become speedily extinct, and the gradual diminution of wooden vessels for some time favored this conjecture. A change has, however, of late been seen, and it is a change that is not without interest to the coal trade. At some of the English ports several large new vessels of wood have been recently built, and at present on the Tyne and on the Clyde many superior iron sailing ships are in course of construction. The re-introduction of sailers to a much larger extent than was some time ago anticipated is no doubt due to the spirit of economy which has permeated during the past two years manifested itself in the shipping business. The reduction of freights, the increase of dues and a diminished carrying trade have led many shipowners to economize, and it is held by some that, under favorable circumstances, the ships that use no fuel will be able to make quick voyages and leave favorable profits. At any rate, the experiment is to be made in many directions.

The *Moniteur Industriel* describes a method of replacing an old-style iron bridge by one of later construction on the line of railroad of the North of Bohemia, between Kutenthal and Stranow—Krnko. The ravine crossed was 98 feet deep, and the span of bridge was 131.2 feet; weight of truss, 80

tons. The method adopted was to erect each bridge span upon rollers, and then, by means of a locomotive, pull it above the place it was to occupy on the top of the old bridge. The span was then raised by hydraulic jacks and the rollers removed. This done, the members of the original bridge were suspended to the new truss in such a manner that the workmen were enabled to remove them, the men working upon a platform swung beneath. As soon as the old bridge was removed the new truss was lowered, a distance of 15 feet, to its final bearing upon the piers. Trains were stopped during the operation of substituting the new truss. The total time consumed was less than 48 hours.

### The Armstrong Stocks and Dies.

The annexed cut illustrates an ingenious arrangement of stocks and dies, brought out by Mr. F. Armstrong, of Bridgeport, Conn. The tool, though on the market but a comparatively short time, has already secured a fair degree of popularity, and its several novel and advantageous features will, no doubt, continue to commend it favorably. As shown in the engraving, it is furnished with two adjustable and reversible dies, held in position by two binding-screws, while the depth of cut may be regulated by the feed-screws at the ends. This facility of adjustment is worthy of some note and will readily be appreciated. Each die has two sets of cutting surfaces, arranged for different sizes of work, which in this case may be either 2½ or 3 inches in diameter, and reversing of the dies is easily accomplished by removing the binding-screws. The cutting surfaces have double tapers, and are so arranged that the dies will readily take hold of the work without the aid of the special attachment usually employed with these sizes, and shown at the bottom. It is supplied with the tool, however, in order to satisfy the wants of custom-

ers, some of whom, until actual use has convinced them of the contrary, consider it a necessary adjunct. The tool is compact and strongly built throughout, and can deservedly claim the attention of pipe-fitters and others having occasion to use tools of this class. Mr. Armstrong's New York office is at 132 Church street.

A very interesting statement upon the causes of idleness has recently been made by the manager of a charitable lodging house in this city, based upon careful observation supported by practical tests. He says it is a great mistake to think that all men out of work are unworthy vagabonds, who will not work unless compelled, though no doubt a high percentage are. He believes that 50 per cent. are unworthy on account of drink, and cannot keep work when they get it, who would be industrious, worthy men were it not for this undermining curse; 25 per cent. are really unworthy from their habitual laziness and unwillingness to do anything in the shape of labor; 20 per cent. are worthy, able and willing to work, but cannot get it to do, and 5 per cent. are worthy, but unable to work on account of some physical or mental defect.

The old property of Van Leer & Custer, at Roysford, Pa., has been taken by Rogers & Benjamin, who have added a new building and commenced the manufacture of fire-brick and stove linings of all kinds. Mr. Rogers is also a member of the firm of Grander, Rogers & Co., stove manufacturers, whose foundry adjoins. The latter firm report a brisk trade, and are especially busy on a Government contract secured some time ago.

Mr. Wm. Clark, senior member of the firm of Wm. Clark & Co., proprietors of the Solar Iron Works, Buffalo, died in Boston last Saturday from blood poisoning, resulting from an operation which was performed on one of his hands. Mr. Clark was also connected with the Pittsburgh Bessemer Steel Company, and with the Carrie Furnace Company.

Haverford College, which is located a few miles from Philadelphia, on the Pennsylvania Railroad, has established a department of engineering, under Prof. James Beatty, Jr., embracing the mechanical, civil and sanitary branches. A fully-equipped machine shop has just been completed. In the civil-engineering studies will be included a course in practical astronomy.

A dispatch from Chattanooga, Tenn., says: "The Woodstock (Ala.) Iron Company has just closed a contract for 13,000 tons of car-wheel iron at \$20.50 per ton. This is the largest order placed in the South since the depression began. Reports from other places indicate increased inquiry for iron."



## The National Charcoal Iron Association.

St. Louis, Mo., October 6, 1884.

The National Association of Charcoal Iron Workers was in session in this city during the past week, and had a successful, pleasant and profitable meeting. In addition to a large number of local members and associates, the following gentlemen registered as visiting members and responded to the roll-call at the first meeting, held in the Southern Hotel, Tuesday, September 30, at 11 a. m.:

S. Brownell, Ironton, Wis.  
S. F. Eagle, Cecil, Ohio.  
Frank King, Virginia.  
John Birkinbine, Philadelphia, Pa.  
J. C. Bayles, New York.  
H. S. Flemming, Philadelphia.  
Walter S. Russel, Detroit, Mich.  
W. M. Potts, Philadelphia.  
Thos. W. Bell, Pittsburgh.  
Percy Warner, Tennessee.  
W. A. Miles, Copake, N. Y.  
H. M. Pierce, Elk Rapids, Mich.  
Moses Lyman, Waverly, N. Y.  
J. A. Mathieu, Detroit, Mich.  
James Stirling, Detroit, Mich.  
A. F. Huston, Coatsville, Pa.  
J. S. White, Fort Wayne, Ind.  
Charles D. Colson, Chicago, Ill.  
W. H. H. Geer, Syracuse, N. Y.  
G. D. Colby, Port Leyden, N. Y.  
W. H. Hoffman, Cincinnati, Ohio.  
S. B. Wright, Detroit, Mich.  
E. C. Wetmore, Detroit, Mich.  
George Noble, Anniston, Ala.  
Charles H. Brown, Knoxville, Tenn.  
J. A. McArthur, Shelby, Ala.  
W. W. Wood, Wood's Falls, N. Y.  
Charles Hinrod, Chicago.  
R. M. E. Plumb, Detroit.  
W. A. Arnold, Reading.  
A. M. Zimmerman, Reading.  
J. Plank, Reading.  
W. M. Kaufman, Reading.  
J. V. Quick, Philadelphia.  
C. J. Holman, Durango, Mexico.  
W. W. McGugin, Olin Furnace, Ohio.

There were also present in the hotel a number of ladies who had accompanied the members, but who found other and more congenial occupations than in attending the business sessions.

President W. H. Lee opened the session with a brief

### ADDRESS FROM THE CHAIR.

which was well received. He welcomed the association to Missouri, and expressed pleasure in being in a position to reciprocate some of the attentions which had been elsewhere shown the Missouri members. He continued as follows:

"The price of iron has shown a steady decline since the last meeting, and to-day it is doubtful if there is one furnace in the United States making money. Some might be disposed to question this statement, but I feel sure it is warranted by the facts when everything is taken into account. What we need to discover is not how to restrict production by an agreement, but how to so cheapen production as to meet the existing market. In Southwest Missouri we have the easiest smelting ores to be found anywhere, yielding 57 per cent. in the furnace and giving a ton of iron to 80 or 90 bushels of charcoal, and even less in some instances. We shall show you wood giving charcoal weighing 25 pounds to the bushel. In the southeastern part of the State we can show you ores yielding 65 to 67 per cent. of iron, of Bessemer quality. When you have gone over the field you will agree with us that nature has done much for us, and we ask you to tell us wherein we have failed."

Mr. Lee then summarized the iron-trade statistics of Great Britain and the United States: "For Great Britain there seems to be no relief; but with us, if we call a halt to our furnace building for a few years, the country will before very long, owing to a population which is increasing faster than that of any nation of the earth, call on us for all the iron we can produce. Until then we must expect low prices, and we must resist them, not by a production restricted by agreement, but by cheapening cost and waiting for improvement due to natural causes."

Mr. Lee congratulated the association in its progress, and suggested the propriety of enlarging its scope to include all departments of iron and steel making. This suggestion was subsequently, by vote of the meeting, referred to a committee for consideration, with instructions to report upon it before the close of the meeting.

Mr. John Birkinbine, secretary, presented two reports, as secretary and treasurer, which showed a satisfactory condition of affairs in the business of the association. It now has 364 active and 14 foreign members. The active members are apportioned as follows: Pennsylvania, 91; Missouri, 39; New York, 35; Ohio, 34; Minnesota, 32; Alabama, 27; Wisconsin, 11; Maine, 11; Connecticut, 16; New Jersey, 10; Maryland, 9; other States, from one to six each.

The treasurer's report showed a balance in bank and good assets for a considerable amount.

At the last meeting a committee of one member from each State was appointed to secure legislation making the association standard bushel for charcoal—27½ cubic inches, or 20 pounds—uniform all over the country. From only one State, Maryland, was it reported that this had been accomplished; but in nearly every State there were indications that the matter would receive favorable consideration at the next session of the Legislature.

In the afternoon the association was called to order at 3 p. m. and proceeded to the reading and discussion of papers. The first paper called for was one by Mr. J. C. Bayles, of New York, on

### THE GRADING AND WAREHOUSING OF PIG IRON IN GREAT BRITAIN.

In response to the very complimentary invitation extended to me at the last annual meeting of this association, I have the honor to submit the following notes on the grading and warehousing of pig iron in Great Britain. Scotch pig is graded as follows:

No. 1 Foundry.	No. 1 Forge.
No. 2 Foundry.	Mottled.
No. 3 Foundry.	White.
No. 4 Foundry.	

In all, seven grades. In former years the Scotch iron-makers used native ores exclusively, and are said to have been very particular to maintain uniformity of stock, but of late they have fallen into the habit of using increasing quantities of mill cinder, which accounts for the fact that many of the inferior grades show upon analysis increasing percentages of phosphorus and sulphur. The four numbers of the foundry grades represent varying degrees of openness in the crystallization, and have no reference to culm percentages, so far as I can learn, except so far as the physical texture of the pig may indicate. The grading of Scotch pig is, consequently, no more accurate than that of American pig, and, as different makers use different mixtures and follow different rules of furnace management, No. 1 or No. 2 cannot be considered fixed standards. In a word, the grading is much the same in Scotland as it is all over the world.

The system of selling pig iron on warrants is in vogue in three different parts of Great Britain, viz., in Scotland, in Cleveland (the district of North Yorkshire, of which Middlesboro' is the center and industrial capital), and on the West Coast, which last comprises the west coast of the county of Cumberland and the Furness (or extreme northern) district of Lancashire. Scotland, however, was the first, and is still the leading, exponent of this system. The storekeepers, Connal & Co., Glasgow, decline to furnish official details of the system they carry out, but the following particulars are sufficiently accurate for all ordinary purposes: The pig iron is sent into the stores of Messrs. Connal, who have enjoyed a practical monopoly of this business for many years. There the iron is examined and received if found up to the ordinary standards. Warrants are then issued, each warrant representing 500 tons, of which three-fifths are for No. 1 pig and two-fifths for No. 3 pig. These warrants are negotiable documents, and are, indeed, the chief medium of speculation as well as of legitimate buying and selling on the Glasgow Exchange. The iron they represent is quoted at so much per ton on the market, and a buyer may purchase any quantity—not necessarily the full amount represented by a warrant. A rent of 1d. per ton per month is charged for storage, and a small fee is payable for transfers as well as deliveries. Up to recently these warrants were unimpeachable in every way, but, as has been reported from time to time in *The Iron Age*, a controversy has been raised, and the system of storing on warrants seriously impeached. Of the 588,000 tons held by Messrs. Connal at the date of the latest mail advices, warrants are in circulation for, say, 540,000 tons, the balance being held on account of particular makers using the stores for convenience of deliveries. Glasgow warrants at one time constituted the leading criterion of the condition of the whole British iron markets, and in some quarters are still looked upon as an accurate indication of the course of prices; but the competition of other localities and the more complex course of modern business in iron have much detracted from their importance as commercial barometers, notwithstanding the fact that Scotch warrants may at any moment become a favorite medium for speculation.

In the Cleveland or Middlesboro' district, pig iron is graded as follows:

No. 1 Foundry.	Mottled.
No. 2 Foundry.	White.
No. 3 Foundry.	Refined Metal.
No. 4 Foundry.	Kentledge.
No. 4 Forge.	Cinder.

These are all graded as G. M. B., or "Good Merchantable Brands," which are stored and delivered without distinction or warranty at the option of the seller (as in Scotland) on warrants. The official stores at Middlesboro', as at Glasgow, are managed by Messrs. Connal & Co., who receive and deal with the iron in the same manner as already described. There is much less business done in warrants in Middlesboro', however, than at Glasgow. Besides Connal's stores at Middlesboro' pig iron is stored by the North-Eastern Railway Company for the convenience of their customers, but no warrants are issued by the railway company for the use of the market generally. The grading of Middlesboro' pig sufficiently explains the quality of the different numbers, Kentledge being in slabs for the use of ships as ballast. Much imported ore has been used of late years, Spanish having the preference in the production of named brands, which are higher in price than the G. M. B., and are usually sold by the makers direct without going into the warrant stores.

Hematite pig is chiefly produced on the West Coast, but is also made in the Cleveland district, in Scotland, at Wigan, in Lancashire (from Algerian ores), in the Forest of Dean (Gloucestershire) and in South Wales. Its chief center, however, is the West Coast, where the native red hematite ores are mainly used by the blast-furnace owners. It is there graded as under:

No. 1 Bessemer (or hematite).	No. 3 Forge Bessemer (or hematite).
No. 2 Bessemer (or hematite).	No. 4 Forge Bessemer (or hematite).
No. 3 Bessemer (or hematite).	No. 5 or Gray Forge, Bessemer (or hematite).
No. 4 Foundry Bessemer (or hematite).	Mottled (or hematite).
	White (or hematite).

Up to the summer of 1881 no system of storing pig iron on the warrant plan was in vogue on the West Coast, but in June of that year a copartnership, styled the West Cumberland Storing Company, was formed for carrying out such a system at Workington. The methods of this company are explained in a circular-letter to the trade, bearing date June 10, 1881, from which I quote as follows:

"The company will be ready to receive pig iron delivered into their store at Workington on and after the 20th inst. The following ironmasters have already agreed to deliver pig iron free into the store on same terms as f.o.b. Workington: The West Cumberland Hematite Iron and Steel Company, Limited; the Workington Hematite Iron and Steel Company, Limited; the Lowther Hematite Iron Company, Limited; the Moss Bay Hematite Iron and Steel Company, Limited; and the Distington Hematite Iron Company. The company also take into their store any other kinds of pig iron which may be delivered to them free of expense. The

iron will be stored in regular turn, according to the intimations received, and warrants will be issued in respect of the same. The charges for piling, weighing, loading into trucks, unloading, reweighing and putting f.o.b. in Workington dock or on railway siding will until further notice be 1/ per ton, payable on the iron being taken into store. The charge for rent will be 1/4d. per ton per fortnight or fraction of a fortnight, beginning from the day when the iron is delivered to the company. The charge for registration or transfer will be 1/ per 100 tons, or fraction of 100 tons, on all iron which is stored or transferred in the books of the company from one party to another, whether fresh warrants are granted or not. The company claim a lien on all iron stored with them for all charges in respect of the same, or for any charges remaining due to them by the holders of warrants. The company only undertake to store iron on condition that the same must be removed on the company giving nine months' notice to the parties in whose name or names the iron stands registered in their books, and, if after such notice the iron is not removed, the company reserve to themselves full power at any time after the expiration of such period of nine months to convey the iron to any other ground, at the risk and expense of the owners. All charges thereby incurred to be paid before the company give up possession of the iron."

Since June, 1881, the Workington warehouse has been in regular operation, and now contains over 50,000 tons of pig iron. Speculation in these warrants is on a limited scale, but they are made use of for shipping and other deliveries. The storekeepers themselves, as well as merchants, will make advances on the warrants, which are in other respects negotiable securities.

Shropshire pig iron is largely used in mixtures for machinery castings, and particularly for chilled rolls. It is graded as follows:

No. 1. Melting foundry.	No. 5. Strong forge.
No. 2. Selected for chilling.	Mottled.
No. 3. Foundry and best open forge.	White.
No. 4. Ordinary forge.	

This is the classification of the renowned Lilleshall Iron Company, whose iron is held in high esteem.

In the Staffordshire district nearly all kinds of pig iron are made, and qualities are as various as brands, owing to the different mixtures of native and transported ores. Silicious ores from Northamptonshire are largely used, as are also ores from Derbyshire, Lincolnshire and elsewhere. The standard gradings in this district are as follows:

Cold-blast mine.	Part mine.
Hot-blast mine.	Cinder pigs.

This grading is self-explanatory—the word "mine" being taken to mean that all native ores are used, and "part mine" that the furnace is charged with various kinds of ores. Cinder, of course, is the meanest and cheapest kind.

Derbyshire pig iron is unique in being of strictly uniform quality, with such allowance as must necessarily be made for irregularities in furnace wasting. All the Derbyshire smelters use the Northamptonshire ironstone. A little of the Lincolnshire ore is used by one or two firms, but it is practically the same as Northamptonshire, except that it contains more lime and less silicon. A leading ironmaster of the district says:

"I don't think any foundry or forge would give 1/ per ton more for any one Derbyshire brand than for any other. Formerly we all used native Derbyshire ironstone, which made a greatly superior pig, but cost 30/ per ton more. To cheapen cost Northampton was introduced as a mixture, and then there was great difference in the 'grades,' varying from all Derbyshire, costing 65/ per ton, to quarter, half and three-quarter Derbyshire, as the case might be, down to all Northampton, costing, say, 40/. But now there is not one firm who gets any Derbyshire ironstone at all, and we are all on one level. Derbyshire pigs rank higher and fetch a higher price than pigs made in Northampton or Lincolnshire, because the Derbyshire smelters have their own coal fields and some one uniform fuel, which is a great advantage, and as they buy their ironstone they get it from several mines, and a great admixture of ironstones is as great an advantage. The Northampton and Lincolnshire smelters buy their fuel, and are continually changing their sources of supply for various reasons—disagreement as to price, &c.—and, as their furnaces are built on their ironstone field, they can only use one stone, whatever its nature may be. If by 'grading' you mean numbers, we nearly all of us make Nos. 1, 2, 3 and 4, though some cultivate foundry iron more than forge, and vice versa."

It is somewhat anomalous to find a furnace industry in the midst of a mining district which does not use a pound of local ore, but depends on an inferior ore brought from a distance.

Lincolnshire pig iron is graded as follows:

No. 1 Foundry.	No. 4 Forge.
No. 2 Foundry.	No. 5.
No. 3 Foundry.	Mottled.
No. 4 Foundry.	White.

It is made wholly from local ores, which are similar to those of the Cleveland district. Lincolnshire pig is largely used in Yorkshire and Lancashire for mixtures.

From this summary of the best data obtainable it will be seen that there is nothing peculiar about the grading of British pig iron. They grade a little closer, apparently, than is usual in this country, but close grading is more necessary there than here, owing to the fact that so little business, comparatively, is done direct between makers and consumers.

The warehousing and warrant systems present some features of interest which may be studied with advantage. They are the outgrowth of conditions in some degree peculiar to Great Britain, and became a part of her commercial system when all the world was to a greater or less extent dependent upon her for iron supplies. On a small scale we have a similar system in this country, and pig iron may be stored and warehouse certificates obtained for it in at least three important centers of the iron trade. But it has not become a dependence of either makers or consumers, for the reason that it is not and has not been at any time a commercial necessity. When the demand is active and the trade prosperous no one has

any iron to put in warehouses. When the demand falls off production is curtailed and pig iron does not accumulate to any important extent. If it did it is doubtful if the prudent buyer would care to supply his wants by purchasing warrants or their equivalent, and taking the chances of a satisfactory delivery. He prefers to know what he is buying, and as far as possible to deal direct with the maker or his agent. No system of warehouse grading would make those fine distinctions which the intelligent consumer finds it to his interest to make in buying iron supplies. Besides, it is usually the case that a customer can deal more advantageously with a maker or his agent, both as regards price and terms of credit, than with a warehousing company. The experiment of buying and selling pig iron in the New York Metal Exchange was a failure for exactly these reasons. Consumers would not come there to buy, and for a little while an appearance of business was maintained on speculative sales and resales of lots never delivered; but in a short time even this was abandoned, and the principal business of the exchange is now in pig iron.

It is urged from time to time by those interested in promoting iron warehouse schemes that the establishment of this system here would be attended with permanent advantage to the trade by providing a balance-wheel for the market, which would effectually check sharp fluctuations. It is argued that in seasons of light demand makers could go on producing, storing their iron and using their warrants as collaterals for bank accommodations. When the demand quickened there would be no scarcity and no chance to run prices up as during the boom of 1879-80. The consumer could supply his wants from the storage-yards, and the fact that there was at all times a stock equal to present and immediately prospective demands would establish and maintain confidence and keep prices steady at a satisfactory average. The argument is specious, but it will not bear close scrutiny. Statistics show that the seasons of wildest iron speculation in Great Britain have occurred when Connal's stores were full, and that when speculators see a chance to corner warrants the stock in store, whether large or small, does not materially affect the course of prices. On the other hand, when prices tend downward large stocks create added alarm and are powerful aids in depressing the market the moment speculation withdraws and leaves iron free to find its level. We have had experience of this in the United States, the heavy stocks of imported iron in bonded warehouse in 1881 hastening a decline which, though inevitable, would not have been so rapid nor so disastrous. Another objection to large stocks in warehouse is that makers in this country prefer to sell their own iron, and experience has taught them that it is not expedient to make more than they can sell. The principal use for warehouses would be after a "boom" had "jibbed," to use a nautical phrase, and belated speculators found themselves loaded up with iron which they could not sell and had no use for. Lots of this kind are, at best, like millstones around the neck of the market. Brokers play football with them, and until they are finally knocked down to some bona-fide purchaser and withdrawn for consumption, they demoralize prices and prevent the restoration of anything like confidence in the stability of values. I cannot see that the situation after a boom would be any better if these old lots were aggregated in warehouses and represented by warrants, but I can see that it would be very much worse if, as the result of a warehousing system, furnace owners were induced to continue producing and piling up iron in dull times. In my judgment it is much better that each maker should shape his business policy with reference to the needs of his market, and that production should increase and diminish in obedience to the natural laws of trade. In this country bank capital finds too many avenues of profitable investment to see an advantage in carrying from year to year a great stock of pig iron in warehouse. Production is too elastic to render this necessary.

As to the argument that warrants or certificates would be attractive objects of speculative interest; that they would be bought eagerly when offering even a small margin of profit, and that prices would thus be kept steady, it may, I think, be dismissed with few words. Primarily, it is not true. We see stocks and securities of all kinds made playthings of in the speculative markets. We find them for months at a time offered, without takers, at prices below their intrinsic value, and we have learned from experience that speculators operate with very little regard to the worth of what they buy or sell. Elevator certificates do not make wheat steady, and speculation is capable of running the price to a figure at which the movement ceases, even when the elevators are full and the barns of the farmers are bursting. Finally, we may ask what benefit the iron trade can hope to derive from speculation under any circumstances? The history of the past 2½ years will furnish the answer. That alone benefits it which encourages legitimate consumption and causes two tons to be used when one was used before. Speculation cannot do this; schemes to restrict production by the banking of furnaces cannot do it. Speculation opens wide the door and invites a deluge of foreign iron from the warehouse stocks of Great Britain. Artificially restricted production galvanizes into brief life the stocks which stand on the border line between activity and abandonment, ready to make iron when the price permits, but incapable of meeting the conditions of a normal market.

Looking at the whole subject from every point of view, I am profoundly impressed with the fact that the welfare of the iron trade in this country would not be promoted by the establishment of the warehouse and warrant system, at least under existing conditions; and that, so far as gradings are concerned, we seem to have nothing to learn from English practice.

Mr. Frank King, of Virginia, expressed appreciation of the paper, and said it did not admit of discussion. The facts were full and exhaustive, and, as to the conclusions drawn from them, there could be no intelligent differences of opinion. The paper covered the

whole subject and left no room for further debate.

The next paper was one by Col. Geo. B. Wiestling, of Mont Alto, Pa., read by the secretary in the absence of the author, on

### SUNDAY STOPS AT THE MONT ALTO FURNACE.

The paper began with a rather deprecatory description of the furnace, which is a stone stack built in 1807, and subsequently remodeled from time to time. It is 9½ feet diameter at boshes by 44 feet high. It has a hearth of 65 inches diameter, closed front, and a 42-inch bell. It is blown by two horizontal cylinders, 46 inches diameter by 6-foot stroke, driven through gearing by an old and badly-proportioned horizontal engine. The blast is heated in a home-made iron stove, constructed with reference to the needs of the furnace 40 years ago, when its product was 2 tons per day. The average temperature of the blast is 500°, and the fuel used exclusively charcoal.

Then follows a description of the charging during the initial stages of the blowing in, which seems to have been attended with very satisfactory working. The object of the description was to show what conditions the over-Sunday stops have been tested practically. Owing to the extreme heat during the first week of the blast the stop was made Saturday morning, to permit an enlargement of the arches to admit more air. She was banked at 1 o'clock a. m., Saturday, August 18, and blast was not put on again until 6.30 a. m. of Monday, the 20th, a stop of 53½ hours. She went "gracefully" and "kindly," seeming to show appreciation of the period of rest allowed. Ever since then the furnace has rested on Sunday. The period of cessation is not always 24 hours, as any necessary changes or repairs are made on Monday before starting up. The tuyere blow-pipes are so arranged that a ball of clay can be introduced into the nozzle as a stopper without removing the tuyeres or connections. The gas down-comers have a damper or valve at the top, permitting the tight closing of the flue. On one occasion the furnaces remained banked from Saturday night until Thursday noon, 100 hours, and then started off on cold-blast iron without difficulty.

Colonel Wiestling gave the detailed records of the furnace, which we cannot here reproduce, and concluded with a vigorous argument in favor of the suspension of Sunday work at furnaces under all conditions. In this argument the moral question is given more weight than the economic. He finds that the extra fuel consumption incident to Sunday stoppage amounted to 16 cents per ton, distributed on the whole product, which is much less than has been ordinarily assumed. Colonel Wiestling thinks that continuous blowing is by no means a necessary condition of good working, but that the record of furnaces which stop on Sunday is better than that of those which do not. He also calls attention to Sunday stoppage as a means of naturally restricting production at this time, and urges the experiment for this reason. In 1883 the Sunday-furnace product of the United States was not less than 735,000 tons. If the production had been reduced 15,000 tons per week there would now be no necessity to bewail over-production.

Colonel Wiestling's paper was listened to with attention and interest, and called out some discussion. The chairman remarked in opening the debate that there were present ironmasters who banked over Sunday and others who did not, and called on Mr. T. J. Scott, as representing the latter class, to speak. Mr. Scott said that, according to Colonel Wiestling's estimates, Sunday stops added 16 cents a ton to the cost of the furnace product. So far as he was concerned, that was at present conclusive evidence of the impracticability of the scheme. Iron men could not stand the pressure.

Mr. W. N. McGugin said his furnace had stood idle on Sundays for 12 years, and he could not see that he had not done as well as his neighbors. In fact, he doubted if he would care to own stock in a furnace which was run on Sunday.

Mr. Frank King thought that Colonel Wiestling's positive testimony, based on a long experience with Sunday stoppages, was worth more than the negative testimony of those who had not tried it, or tried it unsuccessfully. He thought that the results to the trade of such a reduction of product as would result from Sunday stops at all the furnaces would be worth more to the trade than 16 cents per ton.

Mr. Birkinbine closed the debate with a strong argument in favor of Sunday stops, and urged the present as a favorable time for the trial of the experiment.

The last paper of the afternoon was one by Mr. M. N. Lilienberg on

### THE POSITION OF SWEDISH CHARCOAL IRON IN AMERICA.

The paper was a long one, but valuable, and we regret we can give only a brief abstract in this issue:

Although the quantity of Swedish iron products imported into America is of small account, compared with the large masses made in this country, the steady increase of their total values is great enough to attract the attention of American charcoal-iron makers. Several misunderstandings have brought the author to the belief that a review of this subject would benefit all parties, and induced him to give some facts according to his experience. Several large manufacturers in America depend entirely and others partly on the importation of Swedish iron, and the increasing demands on its good qualities imposed by improved machinery, and called forth by sharp competition, have of late made the Swedish iron industry subject to a close observation by Americans. Swedish iron has in this country a position different from other imported irons, and is not to be put on the same level with them. The number of its uses is greater, and its importance, therefore, more elaborate.

In the evening the proceedings were opened by Mr. J. A. McArthur, of Shelby, Ala., on some experiments in charcoal-iron making at the Shelby Furnace, relating especially to the better preparation of ore

(Continued on page 33.)

## Wholesale Hardware Prices, October 8, 1884.

## HARDWARE.

[illegible][illegible][illegible]

**Hammers.** Cheney's, new list, March, 1885. . . . .dis 20c2  
Hartford Hammer Co.'s Nail Hammers. .dis 25c25  
Kipps, J. & Son. . . . .dis 40c  
Hudson & Beckley . . . . .dis 10c  
Verre. . . . .dis 10c  
Hammers, Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 81

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Parallel, Fisher & Morris Double Screw..... dia 15&10  
 Parallel, Stephens..... dia 25  
 Parallel, Parker's..... dia 20  
 Parallel, Wilson's..... dia 20  
 Parallel, Howard's..... dia 40  
 Parallel, Bonney's..... dia 33 1/2  
 Parallel, Merrill's..... dia 15&20  
 Parallel, Sargent's..... dia 30  
 Parallel, Backus and Union..... dia 1&10  
 Parallel, Double Screw Leg..... dia 10&10  
 Parallel, Treatise..... dia 25  
 Parallel, Simpson's Adjustable..... dia 40  
 Saw Filers, Bonney's..... per doz \$15.00, dia 33 1/2  
 Saw Filers..... dia 30&10  
 Saw Filers Hopkins..... per doz \$17.50, dia 10  
 Saw Filers, Reading..... dia 40&10  
 Saw Filers, Wentworth..... dia 30&7 1/2  
 Cowell Hand Vices..... dia 20  
 Richardson's Vise and Anvil..... dia 25  
 Washers.....  
 Johnson's Patent..... per doz \$12.00, dia 20&10&10  
 Penny's..... per doz Pol. \$14; Jap'd. \$10, dia 25  
 Appleton's..... per doz \$16.00, dia 60&10  
 Bonney's..... dia 30  
 Washers.—See Nuts and Washers.  
 Well Heads..... dia 60&10 1/2  
 Brass and Copper, new list, Jan. 18, 1884..... dia 20  
 Market, Bright and Annealed, Nos. 0 to 18..... dia 67 1/2  
 Market, Coppered..... dia 25  
 Market, Galvanized..... dia 50  
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 Annealed Galvanized, Nos. 10 to 14..... dia 62 1/2  
 Cast Steel Wire..... dia 52 1/2  
 Annealed Fence, Nos. 8 & 9..... dia 67 1/2  
 Annealed Galvanized, Nos. 10 to 14..... dia 62 1/2  
 Fence Staples..... per 1000  
 Fence Staples, Galvanized..... per 1000  
 Stanchion Wire..... per 1000  
 Barb Fence..... See Trade Report  
 Wire on Spools..... dia 55  
 Stanchion Wire, Nos. 10 to 30..... \$6.00 to \$2, dia 55  
 Picture Wire..... dia 55  
 Clothes Line, Wire, Galvanized..... per coil 25¢ @ 40¢ net  
 Wire Cloth, green, drab and black, per 100 sq. ft..... \$2.00 @ 2.25 net  
 Wrenches.—American Adjustable..... dia 45  
 Baxter's Adjustable "B"..... dia 35 1/2  
 Stanchion Diagonal..... dia 35&10  
 Coe's Genieuts..... cash in 10 days, dia 60&3  
 Coe's Mechanics..... dia 60&10&3  
 Coe's Pattern, Malleable..... dia 70&15  
 Coe's Pattern, Wrought..... dia 75  
 Girard Standard..... dia 65&10  
 Girard Agricultural..... dia 75  
 Bemis & Call's Patent Combination..... dia 30  
 Bemis & Call's Merrick's Pattern..... dia 35  
 Stanchion Diagonal..... dia 25  
 Bemis & Call's Cylinder or Gas Pipe..... dia 40  
 Alken's Pocket (Bright)..... \$6.00, dia 50&10  
 Tinned Brass..... per doz \$4.00, dia 25  
 Webster's Patent Combination..... dia 25  
 Agricultural Wrenches, Eberhard..... dia 35 1/2  
 Always Ready..... per doz \$4.00, dia 25  
 Alligator..... dia 40&10  
 Donohue Engineer..... dia 25  
 Wingers..... Per doz  
 Novelty, for Common Tubes, No. 2, 10-inch..... \$30.00  
 Novelty, for Common Tubes, No. 3, 11-inch..... 34.50  
 Excelsior, for Stationary Tubes, No. E, 10-inch..... 39.00  
 Excelsior, for Stationary Tubes, No. F, 11-inch..... 43.50  
 Excelsior, with Folding Bench, No. A, 10-inch..... 48.00  
 Excelsior, with Folding Bench, No. B, 11-inch..... 52.50  
 Universal, No. 24..... 30.00  
 Universal, No. 2..... 33.00  
 Adams & Co. No. 8..... 30.00  
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 Peerless No. 32..... 34.50  
 No. 50 Improved 24..... 30.00  
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 Wrought Staples, Hooks, &c.—See Hooks.

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Leather dressed with this oil will not crack or rot, as heat, cold, water or gas has no effect on it. It will spread one-third further and last much longer than any oil for the same purpose. It never turns rancid; will keep in any climate. Belts may be run in water at one end and a hot room at the other, and still be soft, dry and pliable. Warranted not to start glue-laps or gum on belts or pulleys, and to keep the surface perfectly smooth.

**Beware of Imitations Sold at a Cheaper Price, the Color of which is well Calculated to Deceive.**

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"Care should be taken that belts are kept soft and pliable. For this purpose we decidedly advise the use of **"POSTS WATERPROOF BELT OIL AND LEATHER PRESERVATIVE."** When applied as DIRECTED, it makes the Belt smooth, pliable and adhesive, and causes it to hug the pulley closely, so that no power is lost from lack of pulley contact. It possesses excellent preservative qualities and also renders the leather more impervious to dampness than any article in preparation we know of.

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 W. H. Dillingham & Co., Louisville, Ky.  
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 Towner, Landstreet & Co., Baltimore, Md.  
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 C. B. Choate, East Saginaw, Mich.  
 E. G. Studley & Co., Grand Rapids, Mich.  
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**If you cannot get POST'S OIL from your Belt Maker, send direct to us and we will see that you do get it.**

**PRICE, PER GALLON, \$1.50.**

10 gallons,	\$15.00....	boxing and can,	\$1.00.
25 "	37.50....	no charge for	½ Bbls.
50 "	75.00....	" "	" Barrels.

*We solicit Correspondence from Dealers in Manufacturers' Supplies.*

# E. L. POST & CO.,

No. 10 Peck Slip, New York,

SOLE MANUFACTURERS.

# WHOLESALE METAL PRICES, October 8, 1884.

## METALS.

**IRON.**—Duty: Bars, 8-10¢ to 11-10¢ per lb.; provided that no Bar Iron shall pay a less rate of duty than 35¢. Sheet, 11-10¢ to 15-10¢ per lb. Band, Hoop and Scroll, 1¢ to 4-10¢ per lb. Railroad Bars weighing more than 25 lb. per yard, 7-10¢ to 14¢ per lb.

### Standard American Pig Iron.

Foundry No. 1 X..... per ton \$19.50 @ 21.00  
Foundry No. 2 X..... per ton 18.00 @ 19.00  
Gray Forge..... per ton 17.00 @ 18.00

### No. 1 Scotch Pig Iron.

Carnegie..... per ton 20.50 @ 21.25  
Coltess..... per ton 22.00 @ 22.50  
Shotts..... per ton 21.50 @ 22.00  
Glenarrock..... per ton 20.50 @ 21.00  
Gartcharrie..... per ton 21.00 @ 21.50  
Langloan..... per ton 21.50 @ 22.00  
Summerlee..... per ton 21.00 @ 21.50  
Dalmellington..... per ton 20.00 @ 20.50  
Eglinton..... per ton 19.25 @ 19.50  
Clyde..... per ton 20.00 @ 20.50

### Rails.

Steel, at Eastern mills..... per ton 28.00 @ 30.00  
Old Rails, Ts..... per ton 17.00 @ 18.00

### Scrap.

Wrought, per ton, from yard..... 19.00 @ 20.00

### Bar Iron from Store.

Common Iron:  
¾ to 1 in. round and square..... per lb. 1.9 @ 2.0¢  
1 to 6 in. x ¾ to 1 in. .... per lb. 2.0 @ 2.1¢  
Refined Iron:  
¾ to 1 in. round and square..... per lb. 2.0 @ 2.1¢  
1 to 6 in. x ¾ to 1 in. .... per lb. 2.1 @ 2.2¢  
Rods—¾ and 1-16 round and sq. .... per lb. 2.10 @ 2.20¢  
Bands—1 to 6-16 to No. 12..... per lb. 2.40 @ 2.50¢  
"Harden's Best" Iron, best price..... per lb. 2.50¢  
Burden's "H. B. & S." Iron, best price..... per lb. 2.50¢  
Norway Nail Rods..... per lb. 3.00 @ 3.10¢

### Sheet Iron from Store.

Common American Cleaned.  
Nos. 10 to 16..... per lb. 2.70 @ 2.80¢  
17 to 20..... per lb. 2.80 @ 2.90¢  
21 to 24..... per lb. 2.90 @ 3.00¢  
25 and 30..... per lb. 3.00 @ 3.10¢  
Galvanized, 10 to 30..... per lb. 3.00 @ 3.10¢  
Galvanized, 21 to 24..... per lb. 3.10 @ 3.20¢  
Galvanized, 25 to 30..... per lb. 3.20 @ 3.30¢  
Galvanized, 27..... per lb. 3.30 @ 3.40¢  
Galvanized, 28..... per lb. 3.40 @ 3.50¢  
American Russia..... per lb. 3.50 @ 3.60¢  
American Cold Rolled B. B..... per lb. 3.50 @ 3.60¢

### Iron Wire. See Wire.

**STEEL.**—Duty: Ingots, Bars, Sheets, &c., valued at 4¢ per lb. or less, 45¢ ad. val.; valued above 4¢ and not above 7¢ per lb., 35¢ ad. val.; valued above 7¢ and not above 10¢ per lb., 25¢ ad. val.; valued above 10¢ per lb., 15¢ ad. val. Extra—Steel Bars, Rods, &c., cold hammered or polished, in any way in addition to ordinary hot rolling, 15¢ per lb. in addition to above; Steel Circular Saw Plates, 1¢ per lb. in addition to the above.

### American Cast Steel.

For American Steel, see Pittsburgh quotations.

### English Steel.

Best Cast..... per lb. 15.00 @ 15.50¢  
Extra Cast..... per lb. 16.00 @ 16.50¢  
Circular Saw Plates..... per lb. 14.00 @ 14.50¢  
Round Machinery Cast..... per lb. 14.00 @ 14.50¢  
Swaged Cast..... per lb. 14.00 @ 14.50¢  
Best Double Sheet..... per lb. 14.00 @ 14.50¢  
Blister, 1st quality..... per lb. 14.00 @ 14.50¢  
German Steel, Best..... per lb. 14.00 @ 14.50¢  
3d quality..... per lb. 14.00 @ 14.50¢  
Sheet Cast Steel, 1st quality..... per lb. 14.00 @ 14.50¢  
3d quality..... per lb. 14.00 @ 14.50¢  
3d quality..... per lb. 14.00 @ 14.50¢

**TIN.**—Duty: Plates, Sheets, Taggers and Termes, 1¢ per lb.; Bars, Block and Pigs free.  
Banco..... per lb. 21.00 @ 21.50¢  
Straits..... per lb. 20.00 @ 20.50¢  
English..... per lb. 20.00 @ 20.50¢  
Bar..... per lb. 21.00 @ 21.50¢

### Charcoal Tin Plates.

C 10x14..... 225 sheets..... per box \$5.50 @ \$6.25  
C 12x18..... 110 "..... " 11.00 @ 12.75  
C 20x28..... 11 "..... " 6.75 @ 7.75  
C 12x18..... 11 "..... " 6.75 @ 7.75  
C 14x20..... 11 "..... " 6.75 @ 7.75  
C 18x24..... 11 "..... " 6.50 @ 7.00  
each additional X add..... 1.50

### Coke Tin Plates.

Best..... Ordinary.  
C 10x14..... \$5.75 @ \$5.00 @ 5.50 @ 5.25 @ 5.00 @ 4.75  
C 12x18..... 5.50 @ 5.25 @ 5.00 @ 4.75  
C 14x20..... 5.25 @ 5.00 @ 4.75  
C 18x24..... 5.00 @ 4.75 @ 4.50 @ 4.25 @ 4.00 @ 3.75

### Terne Plates.

Prime Char. 3d. quality Coke.  
C 14x20 M. F. 7.25..... \$7.00 @ 14.50  
C 14x20 Tregoning, Old Process..... \$7.00 @ 14.50  
C 14x20..... \$3.00 @ \$4.00 @ \$4.75 @ 4.875  
C 14x20..... 3.50 @ 4.00 @ 4.75 @ 4.875  
C 14x20..... 3.00 @ 4.00 @ 4.75 @ 4.875  
C 14x20..... 3.00 @ 4.00 @ 4.75 @ 4.875  
C 14x20..... 3.00 @ 4.00 @ 4.75 @ 4.875

### Tin Boiler Plates.

IXX 14x20, 2 sheets for No. 7, 112 sheets..... @ \$12.50  
IXX 14x20, 2 " No. 8..... @ 14.50  
IXX 14x21, 2 " No. 9..... @ 16.00

**COPPER.**—Duty: Pig, Bar and Ingot, 4¢. Copper, 3¢ per lb. Manufactured (including all articles of which copper is a component of chief value), 35¢ ad. valorem.  
Ingot, Lake..... per lb. 13.00 @ 13.50¢  
Ingot, Baltimore..... per lb. 12.50 @ 13.00¢  
Brassiers' Copper, ordinary sizes, 16 oz. per sq. ft. and over..... @ 22 ¢  
Brassiers' Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. ft..... @ 24 ¢  
Brassiers' Copper, 10 oz. and 12 oz. per sq. ft..... @ 27 ¢  
Lighter than 10 oz. per sq. ft..... @ 29 ¢  
Circles less than 84 in. in diam..... @ 25 ¢  
84 in. diam. and over..... @ 28 ¢  
Segment and Pattern Sheets..... @ 25 ¢  
Locomotive Fire-Box Sheets..... @ 25 ¢  
Sheathing Copper, over 12 oz. per sq. ft..... @ 19 ¢  
Bolt Copper..... @ 20 ¢  
Copper Bottoms..... @ 20 ¢  
Nickel-Plated Sheathing..... @ 37 ¢  
Plating extra..... @ 25 ¢  
Flat Copper Boiler Bottoms or Pit Bottoms, cut to special sizes..... @ 25 ¢

### Tinning.

14x18, by the case..... per sheet..... 8¢  
14x18, less than case..... 8¢  
For tinning both sides, double the above amount.

**O'Neill's Patent Planished Copper.**—Net.  
2 and 16 oz. and heavier, 35¢ By the case, per lb. 34¢  
12 oz. and lighter..... 37¢

**Copper Wire.**—(See Wire.)  
Sheathing Metal, yellow Sheathing Metal, per lb..... 30 @ 31 ¢

### BRASS AND GERMAN SILVER.

Brown & Sharpe's Gauge the Standard for Metal; Old English Gauge the Standard for Wire.  
Brass Manufacturers' Price List, January 17, 1884..... per lb. 20 ¢

**LEAD.**—Duty: Pig, 3¢ per 100 lb.; Old Lead, 3¢ per lb.; Pipe and Sheet, 3¢ per lb.  
American..... 4 @ 4.125¢  
Bar..... 4 @ 4.125¢  
Pipe..... 4 @ 4.125¢  
Block Tin Pipe..... 4 @ 4.125¢  
Tin Lined Pipe..... 4 @ 4.125¢  
Sheet..... 4 @ 4.125¢  
Shot..... 4 @ 4.125¢  
Chilled Shot..... 4 @ 4.125¢

### ANTIMONY.

Hallett's..... per lb. 11 @ 11.5¢  
Cockson..... 11 @ 11.5¢

### SPECIALTY.—Duty: Pigs, Bars and Plates, \$1.50 per 100 lbs.

American, cash..... 4 @ 4.125¢  
Bergenport..... 4 @ 4.125¢

### ZINC.—Duty: Pig or Block, \$1.50 per 100 lbs.

Sheet, 24¢ per lb.  
60 lb casks..... 5.50 @ 5.625¢  
Zinc—Open..... 6 @ 6.0¢  
Zinc Tubing—Dis. 35 ¢

Plain..... 27 ¢  
Fancy..... 33 ¢  
Scotch and Extra Patterns..... 36 ¢

### RABBIT METAL.

N. P. U..... per lb. 7 @ 7.50¢  
A. 25¢; B. 22¢; C. 14¢.

### WIRE.

**Iron Wire.**—Put up in 63 lb bundles.  
Nos. 00 to 9, 10, 11, 12, 13, 14, 15, 16, 17, 18.

Bright Market Wire..... 14 @ 15 ¢  
Charcoal..... 14 @ 15 ¢  
Bale Wire, Nos. 7 to 12..... 14 @ 15 ¢  
Annealed Market Wire..... 14 @ 15 ¢  
Fence Wire, Nos. 8 and 9..... 14 @ 15 ¢  
Grape Wire, Nos. 10 to 14..... 14 @ 15 ¢  
Bessemer Steel Wire..... 14 @ 15 ¢  
Coppered Market Wire..... 14 @ 15 ¢  
Bale Wire, Nos. 7 to 12..... 14 @ 15 ¢  
Galvanized Market Wire..... 14 @ 15 ¢  
Fence Wire..... 14 @ 15 ¢

### Stone or Weaving Wire.

Nos. 16 17 18 19 20 21 22 23 24 25 26  
Cents..... 14 15 16 17 18 19 20 21 22 23 24 25 26

Nos. 27 28 29 30 31 32 33 34 35 36  
Cents..... 27 28 29 30 31 32 33 34 35 36

Nos. 37 38 39 40 41 42 43 44 45 46  
Cents..... 37 38 39 40 41 42 43 44 45 46

Nos. 47 48 49 50 51 52 53 54 55 56  
Cents..... 47 48 49 50 51 52 53 54 55 56

Nos. 57 58 59 60 61 62 63 64 65 66  
Cents..... 57 58 59 60 61 62 63 64 65 66

Nos. 67 68 69 70 71 72 73 74 75 76  
Cents..... 67 68 69 70 71 72 73 74 75 76

Nos. 77 78 79 80 81 82 83 84 85 86  
Cents..... 77 78 79 80 81 82 83 84 85 86

Nos. 87 88 89 90 91 92 93 94 95 96  
Cents..... 87 88 89 90 91 92 93 94 95 96

Nos. 97 98 99 100 101 102 103 104 105 106  
Cents..... 97 98 99 100 101 102 103 104 105 106

Nos. 107 108 109 110 111 112 113 114 115 116  
Cents..... 107 108 109 110 111 112 113 114 115 116

Nos. 117 118 119 120 121 122 123 124 125 126  
Cents..... 117 118 119 120 121 122 123 124 125 126

Nos. 127 128 129 130 131 132 133 134 135 136  
Cents..... 127 128 129 130 131 132 133 134 135 136

Nos. 137 138 139 140 141 142 143 144 145 146  
Cents..... 137 138 139 140 141 142 143 144 145 146

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Cents..... 147 148 149 150 151 152 153 154 155 156

Nos. 157 158 159 160 161 162 163 164 165 166  
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(Continued from page 29.)

and the more improved and economical heating of the blast. He exhibited drawings of a new hot-blast stove, now building. It is an iron-pipe stove, with 84 syphons and 12 lead pipes, having 55,000 square feet radiating surface. Mr. McArthur described the construction in detail, and stated that with the new stove he expected to get 1000° of temperature in passing air once through the stove, and 1500° when it was twice passed through. In the preparation of his ore he uses a modification of the Bradford washer, consisting of two cylinders working side by side, which have together a capacity of 200 tons per day. The cylinders do not revolve in water troughs, but are supplied by means of pumps. Mr. McArthur claims a good economy and satisfactory results in operation, washing removing at least 10 per cent. of dirt from the ore. With this apparatus he has been able to recover 30 or 40 tons of good ore a day from the dump where it had been thrown as useless.

Mr. Geo. W. Colby described a new roasting apparatus, a modification of the Westermann kiln, which had been built and used with much success at the Katahdin Iron Works, Maine, and at Port Leyden, N. Y. Mr. Geo. Noble, of Anniston, Ala., gave an interesting description of his method of making charcoal from yellow pine in meliers, and exhibited a piece of carbonized wood of superior quality. It had a metallic ring and great strength, and was considered by the speaker better than anything which could be made in retorts or kilns.

Dr. H. M. Pierce described his experience at Elk Rapids, Mich., and a new plant near Nashville, Tenn., in making charcoal in ovens, and gave an account of some remarkable results which had attended the introduction of steam into the kilns during the process of carbonization. We hope at some future time to do fuller justice to his experiments than can be done in notes of his remarks at the meeting.

#### Wednesday's Excursion.

At 7 a. m. on Wednesday morning, October 1, the members and guests of the association took a special train for a run through the iron district of Crawford County and other points in that region.

Arriving at the Midland Furnace, 7 miles from Cuba, a banner was seen moving overhead, with the greeting: "Southwest Missouri cordially greets the Charcoal Iron Workers' Association." The works of the Midland Blast Furnace Company were visited by the party. The furnace is on the Yadin Creek, an affluent of the Meramec. It has a capacity of 45 tons daily. At this point cars were taken for a ride over the Cherry Valley Railroad, 7 miles, to the Cherry Valley mines. The trip was insufferably warm. Mr. Holman, of Mexico, said that at Durango, nearly under the equator, the sun at noonday, which is overhead, casting no shadow, and shining to the bottom of wells 75 feet deep, it was never so hot as he found it in Missouri. Cherry Valley bank No. 1, on the summit of the elevation, is a deep pit, but not now worked. Bank No. 2 is at the foot of the hill, 1/4 mile distant. They have 75,000 tons now on stock, but are prosecuting work. The ore is red hematite, bright gray specular and brown surface ore. A large pit is excavated 50 feet or more below the surface, and a shaft has been sunk 75 feet, showing a rich body of ore beneath. There is a probability that a vein connects with No. 1 bank.

Returning to Midland station, dinner was prepared in the grove overlooking the town. The repast finished, the party again embarked on board the special train and had a run of 23 miles, through Steelville, the county seat of Crawford County, to Salem, the county seat of Dent County, and in the vicinity of the famous Simmons Mountain, with its ore beds. Simmons Mountain is 128 miles from St. Louis, and has been worked for 10 years. It is said to contain one of the largest deposits of specular ore in the central ore region of Missouri. It is an isolated hill about 90 feet in elevation above the plateau south of Salin and covering 30 acres of ground. The main body of the hill is of second sandstone, which was found in pieces on the surface mixed with fragments of chert on the southern side near the base. Higher up it was found mixed with specular surface ore, while some of the surface on the slopes was altered into a brown hematite, but most of it was specular, the latter occurring in boulders of a large size. The excavation consists of a cavity of immense extent, sunk to a depth of 100 feet below the surface, with a wall of discolored earth and sand rock surrounding the chasm. At the bottom of the great cavity a lead has been struck and a tunnel is being worked with a fall of 100 feet in 600, and the ore is drawn out with a wire rope attached to the cars and worked by steam power. It is said that over 500,000 tons of ore have been taken out in 10 years. It is supplied to the Sligo Furnace and some is shipped to the Midland Furnace, and until recently to St. Louis. The company is styled the Missouri Iron Company, of which A. L. Crawford, of Newcastle, Pa., is president. He is also president of the Sligo Furnace Company and president of the St. Louis, Salem and Little Rock Railroad. Some of the more adventurous went into the tunnel and brought away some specimens, especially of ferruginous mud, on their shoes.

Having taken a view of this famous Missouri mine, the excursionists then gathered on the platform on the railroad track, where they spent an hour awaiting the train from Salem to back up and take them aboard. On the platform a sort of improvised meeting was held. Mr. King, of Virginia, made some appropriate remarks on this visit of the association to the great iron fields of Missouri, and concluded by moving a vote of thanks to Mr. W. H. Lee, of St. Louis, president of the association, for the able manner in which he presided and managed the details of the present excursion. The motion was unanimously carried, followed by cheers. Thanks were also voted to Mr. T. J. Scott, in charge of the excursion, to the members of the local committee, the railroad, &c. Mr. W. J. Sankey, late assistant superintendent of Simmons iron mountain, made the statement that the Missouri Iron Company (Simmons iron mountain) had shipped up to the first of January

last 201,386 tons of ore, and the Cherry Valley mines, up to the same time, had shipped 166,926 tons. The trains, with all on board, left Salem about 6 p. m. and arrived in St. Louis about 1 o'clock the following morning, having been side-tracked and otherwise subjected to delays.

**Thursday, October 2,** was a day given to rest and recreation. In the forenoon there was a short but interesting session, continuing the discussion of the question of the economies of charcoal burning, started on Tuesday evening.

Mr. James Sterling, of Detroit, read a paper giving results of practical work with the Mathieu retorts at Port Leyden, N. Y., where their working has been in all respects satisfactory.

Mr. Davenport inquired whether in the carbonization of wood in retorts sufficient gas was had from the wood itself without drawing upon the blast furnace for gas needed to heat the blast. He did not find it so at St. Ignace Furnace, and he would never have built a retort plant if he had supposed he should have had to run them with furnace gas. He understood that at Port Leyden blast-furnace gas was conveyed to the retorts in an 18-inch pipe; he had found a 20-inch plant necessary. He had a plant of 56 retorts, and his experience with them had been entirely unsatisfactory.

This led to a long and rather angry discussion, in which very positive statements were as positively contradicted. Mr. Davenport's construction and management of the retorts at St. Ignace was rather sharply criticised, and stoutly defended, but no conclusion was reached.

The Committee on Nominations reported the following names of gentlemen to fill the offices of the association for the ensuing year, and they were unanimously elected:

**President.**—W. A. Miles, Copake, N. Y.  
**Vice-Presidents.**—W. N. McGregor, Iron-ton, Ohio; Percy Warner, Warner, Tenn.; E. W. Crichton, Oswego, Oregon.

**Managers.**—Orwin W. Davis, M. H. Robbins, W. H. Gere, Wm. Hoagland, W. M. Potts, W. W. Lobdell, C. E. Coffin, Willard Warner, A. G. West, John F. Dixon, Percy Warner, W. N. McGugin, J. N. White, Walter Russell, D. M. Sabin, Seymour Burnell, Egbert Judson, E. W. Crichton.

#### Friday, October 3.

The association was taken on a delightful excursion to Iron Mountain and Pilot Knob. The Iron Mountain was an original concession to the heirs of Francis Valle, and afterward confirmed by act of Congress. Mr. Conrad C. Ziegler, a former State Senator from Ste. Genevieve, took an active part in the organization of the Iron Mountain Company into a corporation, and he was the first practically to develop the iron mines. It belonged to the heirs of Valle when Ziegler took an interest in reorganizing the company. From their commencement the company were heavily in debt up to the time of the war, then quite suddenly prices enhanced and they shipped largely to St. Louis. When the Iron Mountain road got into operation they shipped 1000 tons a day to St. Louis, at \$10 a ton, and paid \$1.90 a ton for transportation from the mine to St. Louis. The capital stock under Ziegler's administration was \$200,000. Now it is \$3,600,000. It is one of the most valuable iron banks in the State. The surface when discovered was covered with a layer 20 feet thick of boulders of ore, associated with ore pebbles and ore sand and but little clay. The ore mantle of detritus represented, according to Pumpelly, only a portion of the concentration. The excavations at the base of the hill show heavy stratified deposits of ore having exactly the same origin, and which was washed down the slope and concentrated by the waves of the silurian ocean. The smaller veins of the Iron Mountain contain apatite, which has been removed, leaving only the impressions of the crystals. The Iron Mountain rises about 250 feet above its base. It was stated that work continued and there were over 100,000 tons of ore in stock. Some is shipped to the Ohio River towns to be used as a "fix."

The excursionists, after an inspection of the country, boarded the train and passed Pilot Knob, which stands uplifted on the left hand side, a famous landmark for the whole surrounding country. At Arcadia a dinner was served. After dinner the train took the party back to Pilot Knob, where they all ascended the southern slope one-third of the way up to the mouth of the tunnel and looked about. Pilot Knob is a conical hill, nearly circular, with a diameter at its base of about 1 mile. Its top is 62 feet above the surrounding plateau and 1521 feet above tide. It is composed of porphyries and beds of specular iron ore. In 1836 the Pilot Knob land was entered by Van Doven, Pease & Co., who proceeded to form a company for speculation. They purchased the Iron Mountain and laid out a city. The Pilot Knob works were begun in November, 1848, under the management of C. C. Zeigler and E. F. Pratt. In 1848 E. Nead shipped metal from Iron Mountain to England, and the following spring received it back manufactured into razors and cutlery by Rodgers & Son, of Sheffield.

The party entered Tunnel No. 3 and passed through 1/4 mile, up some steep places, crossing Tunnel No. 2 and coming out at Tunnel No. 3, near the top of the knob. The tunnel was lighted throughout with electric lights. The atmosphere was cold as a barn, and several ascents as steep as a barrel roof were made, which the ladies seemed to get up with less difficulty than the men. The knob is honeycombed with tunnels and drifts made within the past six years, but in consequence of the depression in the iron business no ore is now taken out.

The excursionists next visited the famous granite quarries, the train backing down some 4 miles for that purpose. The Syenite Granite Company, at Graniteville, are doing a heavy business. About 150 men are at work, and about 10 carloads of paving stones are daily sent to St. Louis. Most of the party visited the gigantic granite boulders—one of them named "the elephant"—which has been reserved in the lease of 9 acres against being destroyed. They are certainly great geological curiosities, and much credit is due somebody for their preservation. These boulders belong to the granite in place, and

were never subjected to the action of the glacial period. The run to St. Louis was quickly made, the train arriving at 8 p. m.

On Saturday the association had a delightful excursion by river to the Crystal Plate Glass Works, and in the evening were entertained at a banquet tendered them by the local members in St. Louis. The meeting was in all respects a delightful one, and but for the excessive heat would have been thoroughly enjoyable in every detail. As it was, nothing but the heat detracted from the pleasure of the visiting members.

#### NEW PUBLICATIONS.

**THE TARIFF ISSUE.** By E. J. Donnell. Size, 7 1/2 x 5 inches, 70 pages, pamphlet edition. Published by G. P. Putnam's Sons.

This pamphlet is the sixteenth of a series published by Putnam, entitled "Questions of the Day," the question dealt with, as in most of the others, being the tariff from a free-trade point of view. It would be a sufficient comment upon the nature of the majority of these pamphlets to note the names of the authors, among whom are David A. Wells, S. S. Cox, J. Schoenhof and other champions of unrestricted exchange less known to fame. Not content with advocating tariff reform, Mr. Donnell at the very outset takes occasion to cast a slur upon newspapers in general, and *Bradstreet's* in particular, whose grievous fault lay in refusing to publish—because of its length—an eleven-column letter of his in reply to a previous one by Mr. Mason. Mr. Donnell in this case, either from ignorance or other cause, evidently did not realize that in attacking *Bradstreet's* he was alienating a friend, and has made the serious mistake of so many of his co-workers, who are ready at the slightest provocation to jump at conclusions without regard to facts or consequences. After a few introductory remarks in the shape of a letter to his publishers, which contains the uncomplimentary allusions to the moral courage of newspapers, above referred to, Mr. Donnell proceeds to the refutation of Mr. Mason. Beginning with the harmful effects of the wool tariff, not mentioning, however, that the wool production of the United States has nearly trebled during the last 20 years, the author continues with a long account of the unhappy condition of things in this country, including some rather amusing statements, such as that there has been no steady, genuine prosperity since the present high protective policy began; that tariff dwarfs manufacture and forces agriculture; that the standard of wages is lowered by tariff; that tariff only protects monopolies, and many others of a like nature, which affirmations he supports by either an inversion of cause and effect or else a reckless admixture of fact and fiction. Such generalities in the way of criticism may perhaps be considered too sweeping, but it is unnecessary to particularize where the merits of a book demand no severe analysis.

**RYLAND'S IRON, STEEL AND ALLIED TRADES' DIRECTORY.** with Brands and Trade-Marks, 1884. Size, 11 x 7 1/2 inches, 668 pages. Published by the Proprietors of the Iron Trade Circular (Ryland's). Price, £1.5/.

This volume is the second edition of Ryland's Directory, greatly enlarged, improved and brought down to date, the first edition having been published in 1881. The feature of the present issue is the allied trades section, embracing all the leading descriptions of iron and steel manufactures, which now for the first time supplement the information relating to the iron, steel and tin-plate branches. Great care, we are told, has been used to insure accuracy in this new section, and to confine the lists to *bona fide* manufacturers as distinguished from the large number of professed makers who are simply factors or agents for the goods they sell. A third section is devoted to iron, steel and tin-plate merchants and recognized agents. The information contained in the book includes the postal and telegraphic addresses of works, names of partners, managing directors and others; addresses of branch offices and names of representatives; nearest railway station or stations; the description of iron, steel or tin plates made; the qualities of such goods; the number of blast furnaces, puddling furnaces, rolling mills, forges, trains, hammers, &c.; the capacity of works, and the brands and trade-marks. The geographical section contains upward of 550 towns alphabetically arranged in counties, and the maps comprise one showing the iron works, iron-ore mines and coal measures of Great Britain, a railway and tram map of South Staffordshire and 12 specially-prepared railway maps. This book, as the above short summary shows, contains a vast amount of useful information, which will prove of value to all who are in any way interested in the iron and steel trades of Great Britain.

**DICCIONARIO TECNOLÓGICO INGLÉS-ESPAÑOL Y ESPAÑOL-INGLÉS.** Por Nestor Ponce de León, New York, 40 and 42 Broadway.

This publication is timely and valuable. It furnishes, in Spanish and English, the correct technical terms for parts of machinery, &c., and, as our relations with Spanish America frequently render the use of such a book quite a desideratum, it is likely the work will have a ready sale. About half of the book, letters A to H, is ready for delivery.

#### Damage from a Broken Water-Pipe.

Considerable damage and great inconvenience have occurred at Boston through the breaking of a large water-pipe on the 4th inst. Two iron bridges with stone abutments are being built over the Boston and Albany Railroad tracks at Brookline avenue. The main water-pipe which partly supplies the city with water had to be raised, and while in that position by some accident a large stone which was being raised slipped upon the pipe and broke it. Immediately a stream of water 15 feet high spouted out. Before the water could be shut off it had made a breach 30 feet long in the main line of track, so that the entire four tracks, sleepers and road-bed at that point were washed completely away. The water in the city will have to be shut off, although there is another reservoir on Parker's Hill.

#### HARDWARE NOVELTIES.

##### The "Champion" Combination-Lock Cash Box.

The accompanying illustration represents a heavy Cash or Deed Box made by the Miller Lock Company, of Philadelphia. The box itself is of tin, well made and ornamentally finished, and presents no special features of novelty. But the peculiarity of this article is that each box is secured by a self-locking combination, three-tumbler "Champion" lock, made by the Miller Lock Company, whose "Champion" drawer locks, made on the same principles, are described in another column. The dial of the lock, as represented in the cut, is large and legible,



The "Champion" Combination-Lock Cash Box.

and is handsomely nickel-plated. Each lock must be opened upon three of its dial numbers, which the owner may readily change, making, as the manufacturers inform us, 50 different combinations by loosening or tightening one screw. Concerning the security which is thus gained, they say that the chances of opening without previous knowledge of the combination do not exceed one in a million. This article is put on the market in view of the fact that most boxes of its class have locks of insignificant value, which are in most cases easily opened with a skeleton key, but the manufacturers of this cash box offer it with confidence that it affords a high degree of security without the trouble of a key, and is thus a fit receptacle for papers or valuables that must be entrusted to another for safe-keeping. Information with reference to the prices on the different styles and sizes of boxes which are made will be found in our Trade columns.

##### New Form of Can-Spout.

The accompanying illustration represents a Combined Brace, Spout and Breast for coal-oil cans, made from a single piece of metal, which is being offered to the trade by Parks & Co., No. 155 North Third street, Philadelphia. The improvement consists in making the spout and breast from one piece of metal, securing by this means a seamless



New Form of Can-Spout.

breast and spout. The construction makes these parts stronger than any other part of the can. Another advantage is the form of opening into the can, which is such that it drains from the base to the apex of the breast, thus preventing flowing over at the can-screw during the operation of filling lamps. Another advantage is that much greater pressure on the nozzle is obtained, thereby securing a free flow. We are informed that Messrs. Parks & Co. supply manufacturers with these can-breasts either with or without trimmings, also any or all parts of oil cans in knock-down shape or complete.

##### A New Scraper.

The cut below illustrates a new Scraper, manufactured by the Eclipse Plane Company, of Coshocton, Ohio. The invention consists in the combination of a metallic plane stock, with the usual handles, with a scraping bit, and is so constructed that the bit can be placed at any desired angle or inclination with the plane throat. The devices for adjusting and securing the bit are very simple, and the various changes in inclination, as well as the removal and replacing bit, can be done or made in a moment. To the inner side of each cheek or side piece, as shown in the illustration, is cut a semicircular shoulder in a radius with the throat from which the circle is struck. These cheeks are connected with a threaded bolt, as shown, by which they may be slightly sprung together and thus clamp together the bracket or sliding segment holding the bit. This



A New Scraper.

segment rests upon the shoulders and is held in place in the semicircle mentioned, in which it travels, by a flange which forms the outer edge of the cheeks. The bit is inserted in the sliding segment and firmly held in position by a set-screw, as is shown. The depth of the cut can be gauged by the eye or by placing the scraper on a flat surface and gently pressing the bit against it; then tighten the bit set-screw, place bit at desired angle and secure the set-screw on the side, and the scraper is ready for work. For finishing all kinds of wood on which a scraper is used, finishing and trueing surfaces for the application of veneer, and for dressing the veneering after it has been applied, the manufacturers claim that this scraper cannot be excelled, and that it will do far more work in a given time with less labor than other scrapers. They call atten-

tion to the combination of the scraper with a stock similar to that used in the ordinary plane, as giving the operator all the advantages in getting at the work to be done that are found in the common plane, while, having no handles at the side, the mechanic is enabled to work with one or both hands, as he may desire. It is finished in two styles, japanned and full-nickeled.

##### An Improvement in Can-Screws.

The Willis Screw Top Company, of No. 347 River street, Troy, N. Y., have ready for the market a new form of Screw Top which possesses the important advantage of keeping the cap attached to the base at all times, thus preventing the loss of the cap. The accompanying illustration shows how this is accomplished. The screw-cap does not differ materially from the ordinary can screw on the market. Below the thread, however, an annular groove is formed, and in this a wire is placed, encircling the cap and looped into

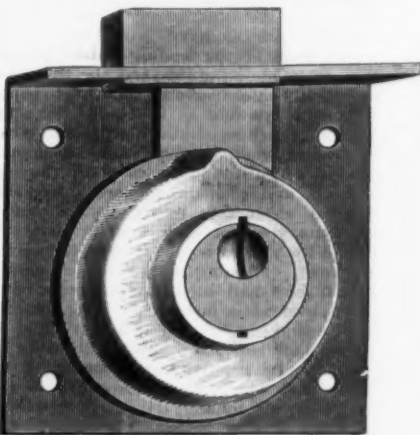


The Willis Can-Screw.

a suitable fastening placed upon the base. The cap slips within the wire when being screwed on or off, and hangs suspended when the can is open. We understand that all ordinary sizes are being manufactured, adapted for use on kerosene cans and also on goods of a larger description, including druggists' and packers' tinware.

##### "Champion" Drawer Locks.

The Miller Lock Company, 821 Cherry street, Philadelphia, have placed upon the market some improved Drawer Locks, one of which is represented in the illustration given herewith. The locks contain circular tumblers or disks, and are adapted to the use of a small flat key. They are known under the general name of "Champion" locks, and are the invention of Milton Jackson, the manager of the Miller Lock Company. We have only space in this connection to illustrate one of the new locks, but it is typical of the entire assortment, so far as its leading features are concerned. The inner cylinder of these locks is shaped like a thimble, with the open end toward the key-hole. The cylinder carries a dog that in locking enters the tumblers inside the cylinder, and in unlocking is forced into a recess formed in the outer shell. The extra security afforded by this lock cylinder arises from the difficulty of arranging the disks without the use of the proper key, so that their notches shall be in line under the dog. The arrangement is such that no motion or strain on the bolts or of any other part can in any way aid in locating the notches. Should any notch



"Champion" Flat-Key Drawer Lock, Made by the Miller Lock Co.

chance to be placed properly, it would be displaced by movements that are necessary to locate the others. In short, the manufacturers claim that the processes by which other locks are readily picked always fail when applied to this lock. A further advantage claimed is the absence of all springs save one. The "Champion" lock cylinder as above described is readily adapted to a wide range of locks. Although the last patent of this device bears date within the present year, the manufacturers have already in the market quite a list, among which may be mentioned locks for drawers and closets, locks for chests and desks, and also locks for post-office boxes, and for safe-deposit boxes. All of these embody the features which we have described. In addition to the particulars already presented, an important advantage claimed for these locks is the application of a master-key to an extent far beyond what has been accomplished in other locks. Having a rotary disk or tumbler, the "Champion" lock readily admits of a very wide range of combinations and at the same time of a special combination to fit the master-key. The manufacturers state that one master-key may control an entire set which may be variously used for drawers, closets, desks and a night latch, thus greatly relieving the proprietor of an establishment of a cumbrous pocketful of keys.

For some time past I. & W. Beadmore, Glasgow, have been engaged in the production of some very large Siemens-steel castings, chiefly for hydraulic rams and marine engine and propeller shafting. They have already turned out some dozens of ingots for such purposes, generally ranging in weight from 25 tons up to 34 tons. The largest of them have ranged up to 20 feet in length, with an average diameter of 3 feet 6 inches. These ingots have subsequently been hammered to the requisite size, and then reduced to suit the purposes for which they were intended.

## Industrial Education.

A very complete summary of the progress being made in mechanical training in Europe is contained in the second report of the Royal Commission on Technical Instruction, lately issued in London. The first volume, of over 500 pages, contains the report itself, dealing with the details of the technical schools on the Continent and in England; the second volume gives the report of the experts on agricultural and industrial schools in England and the United States, and three other volumes contain the evidence of witnesses and other important documents bearing on the subject. A careful reading of the information here brought together will serve to instruct those concerned in this weighty matter. There are many suggestions calculated to prevent repetition of errors made elsewhere, while the active co-operation of trades and industries through their best representatives is shown to be more effective than any merely official supervision. It is of value to see how France suffers for the want of good chemical training, such as is now supplied in Germany and England, as an efficient factor in so many branches of manufacturing. Then, again, it is well to meet the objection of oversupply. By the observation of the Royal Commission it appears that where there were in Germany 1000 civil engineers without employment, there were also 4060 lawyers without clients. Then, too, it is pointed out that in Berlin, where \$2,500,000 were spent on an industrial school, the classes had diminished, but that those in towns where there were large local industries had grown, because employment was readily found in them.

The question of industrial education has ceased to be a matter of argument, for its advantages are now universally recognized, and what is wanted is exact information as to how it is best to be introduced in existing schools. Thus, in Germany again, with its 35,000 students in 40 universities, the learned professions are overstocked, but its industries have grown largely, owing to the superior training of those employed in them. The great business of manufacturing colors and dyes is essentially the outgrowth of science practically applied to the arts, and in one establishment there are 50 scientific chemists, 50 trained foremen and 1400 other workmen. Abroad as well as at home industrial training is coming in to replace the system of apprentices, and with good results both for employers and employed. An interesting glimpse of the homes of workmen abroad is given in the description of the much-praised Workmen's City, in Mulhouse, where there are 1000 or more dwellings, bought and paid for on installments running through a period of 15 years, at an average cost of about \$800. Each has a cellar divided into three rooms, and three rooms on each of the two floors above; but the bedrooms are badly lighted, the stairs mere step-ladders, and the drainage bad; yet this town is a paradise compared to some homes of foreign workmen. Then, too, the theory has run wild in Germany, with its shipbuilding school in Berlin, miles away from shops or the sea, and with schools for the highest branches of technical training, big enough for 6000 pupils and only 2000 in them. On the other hand, in England the technical schools have grown out of the actual needs of the leading industries, and the great London guilds and the provincial industrial centers have set to work to supply just such training as is needed to actual workmen at sums within their reach. Weaving and dyeing schools and mechanical laboratories are growing up where they are wanted, and schoolboards are introducing manual instruction in the use of tools in elementary schools as part of primary education for those who are to earn their living by work. Training colleges for teachers, in which they shall learn enough of science and art to give some instruction in their useful application; more practical work and less mere book-learning; public libraries and museums for popular use; compulsory education as a condition of the employment of children, are among the recommendations that result from this elaborate investigation of the present and the future needs of a thorough system of industrial education.

**A Popular Employer.**—On the 22d ult. Mr. A. B. Farquhar, proprietor of the Pennsylvania Agricultural Works, at York, Pa., returned from an extensive European tour, and, according to the York Daily, his workmen gave him a very enthusiastic reception that evening. They marched in procession from the works to his residence, carrying Chinese lanterns, torches and banners. An address was made to Mr. Farquhar on behalf of the workmen, to which he responded in fitting terms, expressing his pleasure in being permitted to return to them and to receive the assurance of their regard for him. A bountiful collation was an agreeable conclusion of the exchange of courtesies.

**Decisions in Customs Cases.**—The following decisions were rendered by the Treasury Department in customs cases during the past week: 1. The value of tin cans containing chloride of lime or bleaching powder, not of an unusual character, are not to be included in the dutiable value. 2. Bituminous coal used on board enrolled and licensed steam vessels, plying in interior waters of the United States, is entitled to drawback under Decision 6079.

An English exchange says: "A contract for £80,000 worth of steel rails has been given by the Government to a foreign firm. Of this sum upward of £50,000 means wages, which are to be earned by foreign workmen, while English workmen are striving. All the postal cards used in England are made abroad. Let the English workmen remember all this."

Last year the Governments of Belgium, Brazil, Spain, France, Guatemala, Italy, Holland, Portugal, Salvador, Serbia and Switzerland constituted themselves into a union for the protection of industrial property, the United States refusing to join because of interference with our present system of patent laws. This year the English Government became a party to the same arrangement,

which provides that the subjects or citizens of each State shall in all other States of the union, as regards patents, industrial designs or models, trade-marks and trade-names, enjoy the same advantages that their respective laws now grant or shall hereafter grant to their own subjects or citizens.

At Youngstown, Ohio, on the 2d inst., occurred the death of J. M. Ronnell, of the firm of Bonnell, Botsford & Co., and a partner in the Mahoning Valley Iron Company. Mr. Bonnell was born in England, and came to America about 20 years ago. He was well known in the West in the iron trade, and was at one time a member of the firm of Hale, Cleveland & Bonnell, of Chicago. He was 36 years old, and leaves a wife and three children.

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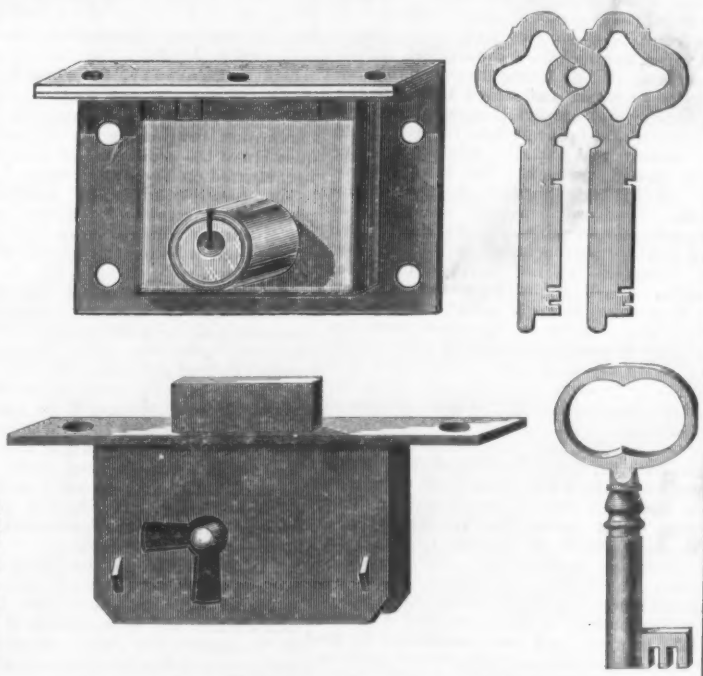
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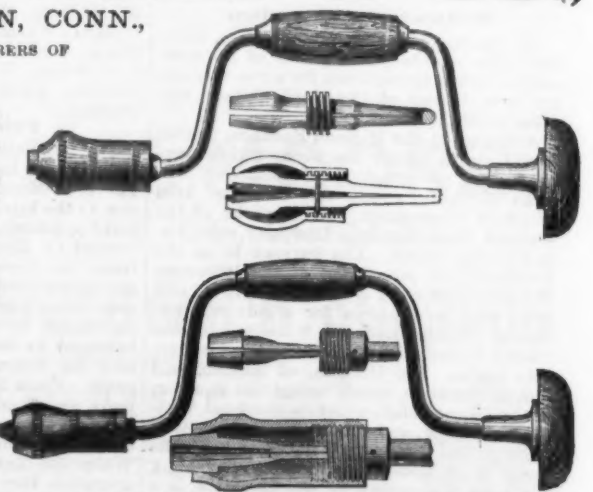
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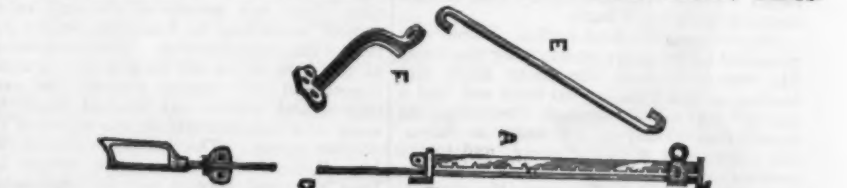
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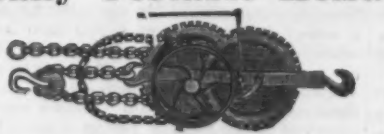
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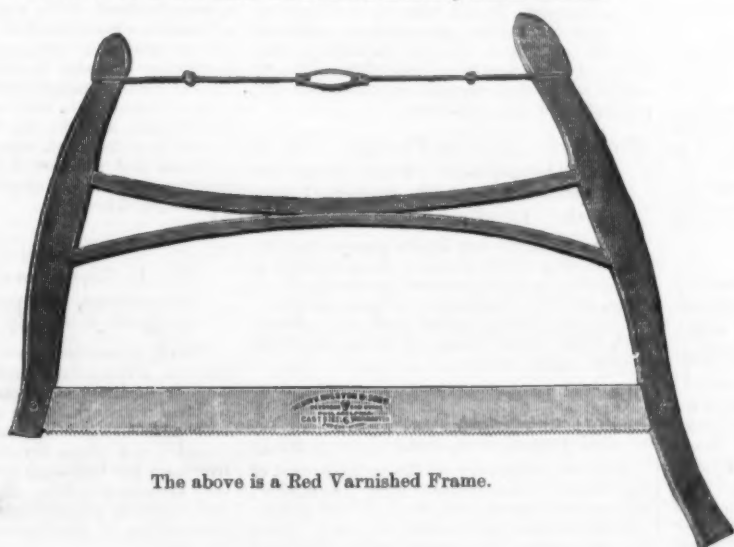
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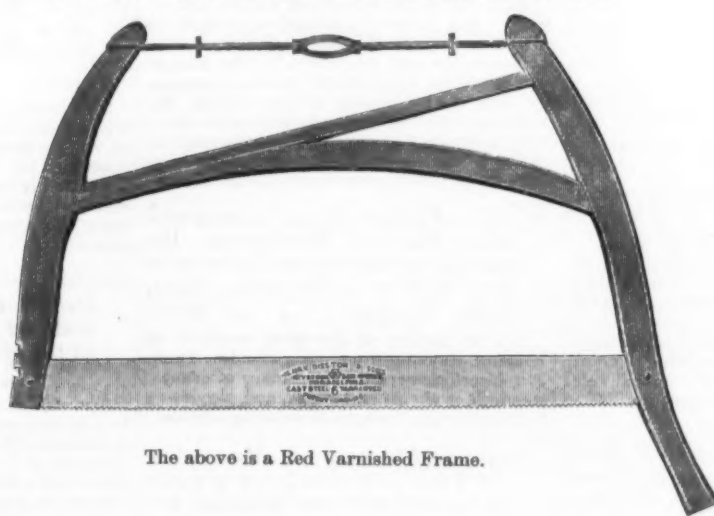
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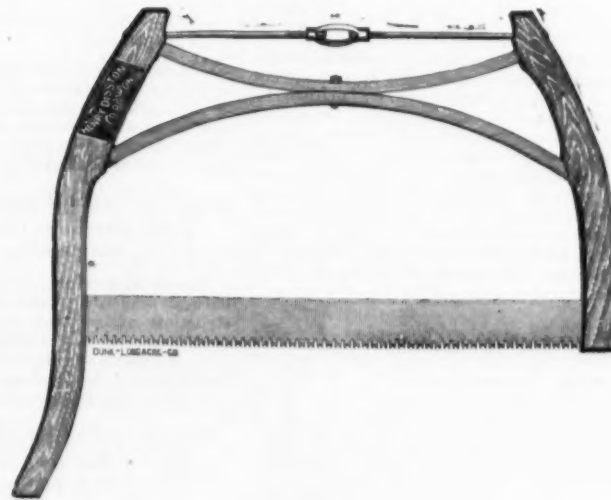
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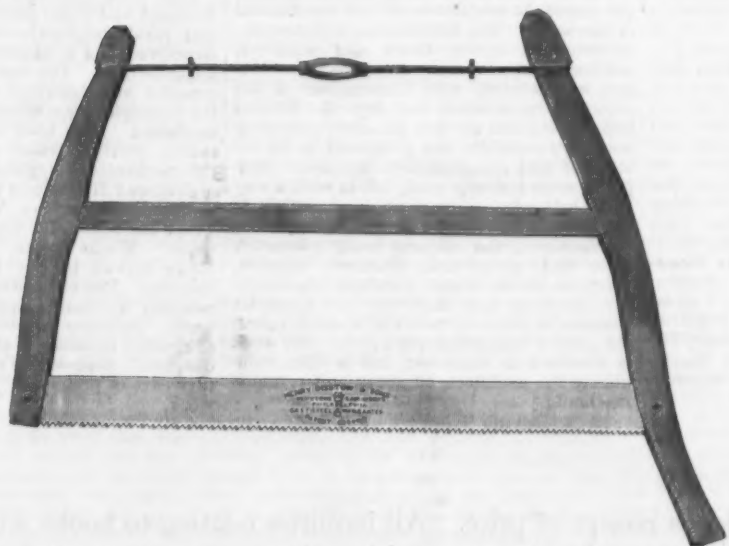
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This handbook for mechanical engineers contains the application of the slide-valve and link motion to stationary, portable, locomotive and marine engines. All dimensions of the valve may be easily found by means of a printed scale, and the proportions of the link determined without the assistance of a model.

*Baker.—Long-Span Railway Bridges.* By B. Baker; 2 plates, 97 pages, 12mo, cloth; . . . \$1.50

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*Beardslee.—Strength of Wrought Iron and Chain Cables.* By Commander L. A. Beardslee, revised by William Kent, C. E.; illustrated, 119 pages, 8vo, cloth; . . . \$1.50

This is an abridgment of a report of United States Government committees appointed to test the strength of iron, steel and other metals. It includes investigations into the physical and chemical properties of rolled wrought iron. The book is illustrated by heliotype engravings, showing fracture and crystallization, and is of practical value to iron manufacturers and engineers.

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*Campin.—Details of Machinery.* By Francis Campin, C. E.; 54 illustrations, 270 pages. (Weale's series.) London, . . . \$1.40

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*Clerk.—Theory of the Gas Engine.* By Dugald Clerk; 164 pages, 18mo, boards; . . . \$0.50

This little work is a reproduction of an essay read at a meeting of the British Institution of Civil Engineers, and is an excellent presentation of the theory of the gas engine and the improvements made in this motor in the past few years. The paper embraces a number of diagrams of different types of gas engines, such as the Lenoir, Otto and Clerk engines, the Brayton petroleum engine, and several others.

*Cooper.—Treatise on the Use of Belting for the Transmission of Power.* By John H. Cooper, M. E.; 83 illustrations, 310 pages, 8vo, cloth; . . . \$3.50

This is the standard work on belting. There are numerous illustrations of approved methods of arranging main, driving and quarter-twist belts, with examples and rules for calculating the size and driving power of belts, and practical directions for their care and management; also descriptions of many varieties of belting, collected from the best American and foreign sources. There are chapters on the transmission of power by ropes, by iron and wood frictional gearing, and on the strength of belting leather; also an exact translation of Morin's paper on the variation of the tension of leather belts, and remarks upon the experimental investigations of Briggs, Towne and others.

*Drinker.—Tunneling, Explosive Compounds and Rock Drills.* By Henry S. Drinker, E. M.; 2d edition, revised, enlarged and brought up to date, with profiles, maps and over 1000 illustrations, 1200 pages, text, 1 vol., 4to, half morocco; . . . \$25

Giving the details of practical tunnel work, the constituents and properties of modern explosive compounds, the principles and approved methods of blasting, and full descriptions of the various rock drills and compressors, their uses and management. The different American and foreign systems of timbering and arching are discussed, and tables presented showing the cost and dimensions of over 2100 tunnels in every part of the world. All measures in the tables are given both in feet and in meters.

*Edwards.—Modern American Marine Engines, Boilers and Screw Propellers.* By Emory Edwards, M. E.; 30 large plates, 146 pages, 4to, cloth; . . . \$5

This is an elaborate treatise upon the design and construction of the marine engine. The theory of the compound engine is thoroughly and practically explained, and there are chapters on "How to design marine boilers and screw propellers." The numerous examples contributed by the promoters, builders of the United States exhibit the most successful practice of the present day; among others, there are plates of the engines of the latest Pacific Mail and Morgan Line steamships and United States sloops-of-war.

*Glynn.—Construction of Cranes and other Hoisting Machinery.* By Joseph Glynn; 6th edition, numerous illustrations, 122 pages, 12mo, cloth. London, . . . \$0.60

A brief history of the early methods of hoisting, showing the progress made. There are descriptions of the machinery of cranes, strength of chains and ropes, and necessary foundations for fixing and securing cranes.

*Goodeve.—Elements of Mechanism.* By Prof. T. M. Goodeve; new edition, rewritten and enlarged, 257 illustrations, 345 pages, 12mo, cloth; . . . \$2.50

The leading principles of mechanics and their applications are clearly explained. The work will afford practical assistance to students and others in understanding the intricate combinations of modern machinery.

*Harrison.—The Mechanic's Tool Book.* By W. B. Harrison; 3d edition, 44 illustrations, 278 pages, 12mo, cloth; . . . \$1.50

This book is especially adapted to machinists and ironworkers in general. It is made up of the workday experience of an intelligent and ingenious mechanic, who describes many useful plans and suggestions for labor-saving in a practical and intelligible manner.

*Joynson.—On Machine Gearing.* By F. H. Joynson; 18 folded plates, 50 pages, 8vo, cloth; . . . \$2

This book is offered as a guide to mechanics and students in the designing and construction of general machine gearing—as eccentrics, screws, toothed wheels, &c. It contains also a selection of geometrical problems useful to the mechanical draftsman, with practical rules and details.

*Nicholls.—Theoretical and Practical Boiler Maker.* By Samuel Nicholls; 273 pages, 12mo, cloth; . . . \$2.50

This work is the American reprint of a book that has taken high rank as a thorough and reliable instructor in the art of steam-boiler construction. The author is a practical foreman boiler-maker, and in a simple manner he has given a variety of useful information, which may be relied upon as covering every branch and detail of his subject.

*Rankine.—Manual of Civil Engineering.* By Prof. W. J. M. Rankine, 13th edition, thoroughly revised by W. J. Millar, C. E.; with numerous diagrams, pp. 808, 8vo, cloth. London, . . . \$6.50

This work is divided into three parts. The first treats of surveying, leveling and general field work. The second part relates to the properties of the materials used in engineering works, such as earth, stone, timber and iron, and the art of forming them into structures. The third part treats of roads, railways, systems of water supply, canals, harbors, &c. In the present edition additions have been made to the appendix upon recent practice in civil engineering.

## IRON, STEEL AND METALLURGY.

*Barba.—The Use of Steel.* By J. Barba; translated from the French by A. L. Holley; illustrated, 110 pages, 12mo, cloth; . . . \$1.50

Treats of the composition and classification of steel for constructive purposes, with methods of working, applying and testing plates and bars.

*Davies.—Metalliferous Minerals and Mining.* By D. C. Davies, M. E. 2d edition, revised, 148 illustrations, 450 pages, 8vo, cloth. London, . . . \$3

This book is an excellent and systematic description of the conditions under which metallic ores are found in the different countries of the world. It explains the origin of deposits, and defines the localities occupied by the various metallic ores, with practical details in the working of mines and the dressing of ores.

*Percy.—Manufacture of Russian Sheet Iron.* By John Percy; 12 illustrations, 23 pages, 8vo, pamphlet; . . . \$0.50

This little pamphlet, by a well-known English author, consists chiefly of a description of various methods of making sheet iron as practiced by Russian engineers. The information is very complete, considering the size of the work, and there is an appendix upon the manufacture of American sheet iron.

*Spretson.—Casting and Founding.* By R. E. Spretson; 2d edition, with 82 plates drawn to scale, 412 pages, 8vo, cloth. London, . . . \$7

The object of this work has been to collect in one volume every subject on which a founder will require information. It embraces a full discussion of modern English and Continental practice in casting, founding, molding and case-hardening iron, steel, brass, bronze and other materials a founder may have to deal with. The illustrations show working drawings of cupolas, furnaces, blowing engines and all the machinery necessary to the art. The methods of founding statues, bells and articles used for art work and ornamentation are practically described.

*Greenwood.—Steel and Iron.* Comprising the practice and theory of the several methods pursued in their Manufacture, and of their treatment in the Rolling Mill, the Forge and the Foundry. By W. H. Greenwood; 97 illustrations, 536 pages, 12mo, cloth. . . . \$2

This work satisfactorily presents in convenient form the most important processes employed in the manufacture of iron and steel. The illustrations are in most cases reduced from actual working drawings. The style is simple and clear. Although many of the recent improvements in American practice have not received the thorough attention which they merit, the book treating more particularly of English practice, the author has succeeded in producing a comprehensive manual for the technical student, and an intelligible and valuable assistant to the practical iron-worker. The chapter headings are as follows:

Explanation of Terms; Refractory Materials, Crucibles, &c.; The Ores of Iron; Metallurgical Chemistry of Iron; Cast or Pig Iron; The Production of Pig Iron; The Blast Furnace; Hot-Blast Stoves, Hoists, Lifts, &c.; Fuel, Blast, Charges, Yield and Waste Gases of the Blast Furnace; Castings in Iron, Foundry Appliances, &c.; Malleable or Wrought Iron; The Production of Malleable Iron Direct from the Ore; Indirect Methods for the Production of Malleable Iron; The Production of Malleable Iron in Open-Hearth Furnaces; Refining of Pig Iron; Puddling; Mechanical Puddling and Rotary Puddling Furnaces; Forge and Mill Machinery, Furnaces, Plant, and Operations; Steel and Ingot Iron; The Methods Employed in the Production of Steel Direct from the Iron Ore and by the Carburation of Malleable or Bar Iron, by the Decarburization of Pig Iron in the Finery or in the Puddling Furnace, by the Fusion of Pig Iron with Malleable Iron or with Iron Ores in the Open-Hearth Steel-Melting Furnace; The Bessemer or Pneumatic Process for the Production of Steel from Pig Iron; The Basic Process for the Conversion of Phosphoric Pig Iron into Steel in the Bessemer Converter; The Production of Homogeneous Steel Ingots, Fluid Compression of Steel, Compound Armor Plates, &c.

*Gore.—The Art of Electro-Metallurgy.* By G. Gore; illustrated, 391 pp., 12mo, cloth; . . . \$2.50

Platers and gilders will find in this work a concise statement of the history and principles of electro-deposition, the general rules to be followed in actual working with all metals, and the special means of depositing nearly every known metal and metalloid.

*Graham.—Brass Founders' Manual.* By Walter Graham; numerous illus., 141 pages, 12mo, cloth. London: (Weale's series). . . \$0.80

This little volume contains instructions for modeling, pattern making, molding, alloying, turning, filing, burnishing and brazing. Copious recipes and tables are presented, together with notes on prime costs and estimates. Although designed for English practice, it contains many suggestions valuable to brass founders in this country.

*Urbain.—Brill.—A Practical Guide for Puddling Iron and Steel.* By E. Urbain and A. Brill; 83 pages, 8vo, cloth; . . . \$1

This work, translated from the French by A. A. Fesquet, dwells fully upon the chemical reactions taking place during puddling, and contains hints upon the relative proportions of the firebricks, bed, flues, &c., to which is added a comparison of the resisting properties of iron and steel.

*Urquhart.—Electro-Plating.* By J. W. Urquhart; with numerous illustrations, 216 pages, 12mo, cloth. London, . . . \$2

Any ordinarily intelligent person may become skilled in the practice of electrotyping by consulting this practical handbook, which gives, in simple language, working directions for copper, silver, nickel and gold plates; with clear explanations of terms and tools adapted to the work.

*West.—American Foundry Practice.* By Thomas D. West; illustrated, 391 pages, 8vo, cloth . . . \$2.50

A practical treatise on the management of cupolas and the melting of iron. The author, a practical foundryman, treats of the molder and his trade, green-sand molding; loam and dry-sand molding, and the manipulation of iron castings. The work is a valuable addition to the list of books upon this subject.

## CONSTRUCTION AND MATERIALS.

*Carpentry and Joinery.* Chiefly composed from the standard work of Thomas Tredgold, with additions from the works of recent authorities, and containing a treatise on joinery. By E. W. Tarn; 300 pages, 4 by 7 inches, illustrated, cloth, \$1.40. Atlas of plates to the above, with descriptive letterpress, 35 plates, quarto, \$2.40. Price of Manual and Atlas, \$3.80

To those who are acquainted with the standard work on Carpentry and Joinery by Tredgold, little more needs to be said in description of the above work than that it is a cheap edition, somewhat abbreviated, of the larger work. The additions mentioned in the title are important, and render the work very desirable as a text-book and a book of reference. The work puts in a practical shape the best ideas of the standard authorities in carpentry and joinery. The chapter on joinery describes English rather than American practice, but nevertheless will be found valuable to American readers.

*American House Carpenter.* By R. G. Hatfield; 685 pages, 46 by 9 1/2 inches, 450 illustrations, cloth, \$5

The first part of this book, embracing some 300 pages, is architectural and mechanical in character. The divisions are architecture, construction, stairs, doors and windows, moldings and cornices. Approved construction is presented, with illustrations of the principles upon which they depend. Strains and thrusts, and the best means of providing necessary strength, are presented in an intelligent and comprehensive manner. Simple formulae are freely used, but in such a way as to make its presence no disadvantage to the book. The second part is mathematical in character, the subjects being geometry, ratio and proportion, fractions, algebra, polygons, circle, ellipse, parabola, trigonometry, drawing and shadows. An appendix contains a glossary, tables of squares, cubes, &c., and a comprehensive index. The work is standard in character, and is alike valuable to the architect, engineer and common mechanic.

*Every Man His Own Mechanic.* 750 illustrations; 816 pages, large 8vo; bound in cloth . . . \$3

A complete and comprehensive guide to every description of constructive and decorative work, especially adapted to the amateur artisan and apprentice. Valuable, for reference, to the carpenter and builder. In three parts: I. Household Carpentry and Joining. II. Ornamental and Constructive Carpentry. III. Household Building Art and Practice. Containing practical suggestions and directions as to tools and their uses, cabinet work, masonry, bricklaying, plastering, painting, paper hanging, plumbing, &c.

*Practical Treatise on Limes, Hydraulic Cements and Mortars.* By Q. A. Gillmore, A. M.; revised and enlarged, 334 pages, 6 by 9 inches, illustrated, cloth. . . . \$4

General Gillmore is the acknowledged authority upon the subjects treated in this work. The experiments and researches which furnish the groundwork for all the original matter contained in the work were conducted under the authority of the Engineers' Bureau of the War Department, and were completed in the summer of 1861. The subjects are considered in all their bearings. The geographical and geological localities of hydraulic cements in some parts of the United States, manufacture of cements from different materials and under different circumstances, and the test of cements, are presented in a thorough manner. The uses of cements and mortars are also considered, making the book a valuable one to masons, plasterers, &c.

*Fryer.—Architectural Ironwork.* By W. I. Fryer; with numerous illustrations, 220 pages, 6 by 9 1/2 in., cloth . . . \$3.50

This is a practical book for architects, engineers, ironworkers and all whose professional or business connects them with architectural ironwork. The organization, financial and mechanical management of a foundry and shops for the manufacture of ironwork for buildings are described in the best manner possible. Specifications, tables and valuable suggestions for the successful prosecution of the business are included in the work.

## MISCELLANEOUS.

*Baldwin.—Steam Heating for Buildings.* By Wm. J. Baldwin; 4th edition, with many illus. plates, 234 pages, 12mo, cloth, . . . \$2.50

This book is one of the most practically valuable that has appeared in a long while. It is especially adapted to steam-fitters, and contains directions for piping buildings and setting boilers properly, with descriptions of the most approved forms of apparatus for warming and ventilating private houses and large buildings, and for cooking purposes. There can be no opportunity for bungling work if the mechanic is familiar with Mr. Baldwin's excellent plans and suggestions.

*Plumbing.* By W. P. Buchan; 4th edition, revised and enlarged, about 330 illustrations, 307 pages, 4 by 7 inches, cloth . . . \$1.40

A handy text-book for the apprentice plumber, giving the details of his trade, including explanations of flushings, gutters, waste and soil pipes. There are also chapters on scientific and safe water-closets and an improved system of drainage.

*Bayles.—House Drainage and Water Service.* By James C. Bayles; 5th edition, 3 folding plates and 30 illustrations, 365 pages, 8vo, cloth . . . \$3

This work discusses the subject of house drainage and water service in cities, villages and rural neighborhoods in a manner instructive alike to architects, mechanics and house owners. The best forms of plumbing practice are described and illustrated, and the principles upon which good work depends explained. The book is of practical value to the building trades and all interested in the mechanics of hygiene. The contents are as follows: Hygiene in its practical relations to health. Sewer gas. Waste and soil pipes. Traps and seals and the ventilation of soil pipes. Water closets. Service pipes and water service in city houses. Tanks and cisterns. The chemistry of plumbing. Elementary hydraulics applicable to plumbing work. Sanitary construction and drainage of country houses. Water supply in country districts. Suggestions concerning the sanitary care of premises. The plumber and his work.

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## English Letter.

(From Our Regular Correspondent.)

LONDON, September 22, 1884.

## THE OUTLOOK

is once more believed to be a shade brighter in some quarters, but, so far as actual records have been in question, the improvement cannot be said to have presented any features of real vitality. That some branches of the hardware industries are in receipt of better orders is beyond question, seeing that many concerns at Sheffield, Birmingham and a few other large centers have become visibly busier within the past fortnight. The summer has been so greatly prolonged (over 83 having been registered last week) that many repeat orders have come to hand for traveling trunks, dinner plated ware and other articles largely used at the health and pleasure resorts. These places have all done so well this year that they are beginning to buy more freely of lamps, chandeliers, stoves and other winter fittings than usual, their orders being at present among the earliest and best booked by the manufacturers. From the rural districts come fairly good accounts of the doings of the "drummers," who are endeavoring to reap the outcome of the harvest on behalf of their employers. The ironmongers of the market towns are buying in better fashion, and are taking superior grades of goods to those of the past few years, thereby affording proofs of the ameliorated condition of the people who depend upon them for supplies of hardware of all sorts. Scotland is also yielding a satisfactory amount of support to the general industries already spoken of, the remarkably fine and open weather being exactly what was needed to facilitate the safe ingathering of the late crops of the Highlands and North of Scotland—where wheat, oats, barley, &c., are rarely harvested prior to the end of September, and occasionally very near to Christmas. Ireland, all things considered, is buying on a fairly good scale, the exceptionally dry and hot summer having been of peculiar value to the sister island, which is specially liable to have its crops spoiled by persistent wet. Some houses, indeed, find Ireland their best customer, and have done so for two or three years past, the "no-rent" movement having enabled the peasantry to expend their cash in any direction save for the benefit of the landowners. Lastly, we have London, which, with its population of nearly, or quite, 5,000,000, is of superlative importance as a market for all classes of our manufacturers. Reports from certain classes of tradesmen in the metropolis are still couched in pessimistic tones. They deplore a comparatively poor "high" season—that is, from April to July—owing to the death of the Duke of Albany, but hope that the late autumn and winter may make up to some extent for what has been missed hitherto. So far the wealthier classes are still in the country or touring, but the first cold snap will send them back wholesale, and, in any case, Parliament will reopen toward the end of October, and will needs bring back all the members of both Houses for the anticipated exciting debates on the franchise question. In the city proper some of the merchants and large middlemen speak in rather more hopeful terms of the situation and prospects. They have rather better news from the Australian Colonies and New Zealand, and think there would be a marked change for the better were it not for the French operations in the East and the cholera in the South of Europe. Even as it is they are not so despondent as they were some time ago, and are inclined to the belief that the year will wind up fairly well. It will thus be seen that, on the whole, there is a little more animation in business circles, and that we seem to have a glimpse of a brighter future. The changes of the moment are not great, but they hold out the hope of better things to come before long.

## THE INSTITUTE MEETING.

To-morrow the autumn meeting of the Iron and Steel Institute will be opened at Chester, instead of at Sheffield, as was originally proposed. There is likely to be a good attendance, some 450 or so members having already made known their intentions of being present. At Chester itself there is little of purely trade interest to be seen, but the city is extremely quaint in many respects, its walls being the most perfect in this country. It is also a good center for excursions, being the great railway station for departures to North Wales and its beautiful scenery. The great works of the London and North Western Railway Company, at Crewe, where some good men are employed, are to be visited, and will be found to present many features of interest, as also will the works of Lloyds Testing Company (for chains, cables, &c.) and several local iron or engineering establishments. Liverpool and Birkenhead are also within easy distance, and the salt mines of Droitwich, &c., may be visited by those whose tastes lie in that direction. Of the literature of the meeting I need not say much here, as you will receive copies of the papers, but I venture to predict that Mr. Henry Seebohm's discourse on the manufacture of crucible steel will attract the lion's share of attention. It is a well-done paper all round, and gives a capital résumé of the industry, while at the same time presenting much food for thought to those who have endeavored to work in this branch by the light of modern science instead of exclusively by the old rule-of-thumb method. Mr. Seebohm seems to hint that the chemists know very little indeed about steel, and defends Sheffield from the sneers of those who seek to show that the crucible-steel makers are behind the age. He dwells upon the localization of the trade at Sheffield, and, somewhat singularly, omits to do justice to the efforts and successes of the American manufacturers, although I happen to know (*entre nous*) that he has the highest opinion of the skill of certain manufacturers not a thousand miles from Pittsburgh. This omission may be, and no doubt is, unintentional, for the author of the paper is a cosmopolitan, and is thoroughly independent of small local prejudices; besides which he is well aware that some of the American steel houses use

exactly the same mixtures as some of the best Sheffield concerns, and do so with conspicuous and unvarying success. In alluding to the meeting not being held at Sheffield, Mr. Seebohm remarked that the Sheffielders felt that they must guard their little mechanical devices, &c., by keeping them strict secrets—a course of action which they felt was far safer and more politic than to seek the doubtful protection of the patent laws. I believe many excellent business men have of late come to the same conclusion.

## "LIMITED" COMPANIES.

"Old hands" in the iron, steel and engineering trades often declare that companies on the "limited liability" principle have been and are certain to be the ruin of these industries. The shareholders are mostly persons having no knowledge of the trades in which they thus embark, and the amounts they individually invest are generally placed as a speculation. They are in the power of two or three gentlemen who are originally sanguine of success, and during good times large dividends are often paid. When the pinch of adversity comes they feel it severely, the lack of personal interest, concentrated management and diverse views rendering them less stable than private undertakings. They plunge wildly, and recklessly seek to minimize their losses by extending their means of production out of all proportion to the legitimate wants of the trade at large. These reflections are suggested by the reports of several limited companies, recently issued, although I do not intend them to have any special or direct reference to the concerns to which I am about to allude. The report of the Monkland Iron Company, however, has undoubtedly been much discussed, and is a case in point to the extent that the directors confess that they have made heavy losses, owing to the low prices of iron. The report is as under: "The balance at the debit of revenue account, which last year amounted to £20,601, is now £46,861, showing a loss for the year of £26,170. Investigations into the cause of this loss have been made by the directors, and the only explanation they can give of it is the low price of pig iron during the year. Under these circumstances the directors have seriously considered the position of the company, and have come to the conclusion that the only course open to them is to stop the production of ironstone and such coal as cannot be sold at a profit, and meantime, to work up the redundant stock of ironstone and convert it into money. Besides, the directors mean to make an earnest appeal to the owners of the minerals for a concession of the fixed rents for one year, as well as a large reduction in the royalties for years to come. These royalties amount on a ton of pig iron, worth 41/6, to no less than 7/3 ton, while the railway companies receive in carriage 8/6 on every ton of iron made. A very considerable reduction in royalties and carrying rates is therefore necessary if G.M.B. iron is to be made in this country. The outlay on capital account during the year has again been heavy, but this outlay has been mainly made to obtain increased outputs, and so diminish costs. In order, as far as they can, to mitigate the loss, the directors have abstained from charging the fee of £1000 to which they are entitled under the articles."

It is only fair to say that the present directors are new to the management, but the inference is that some of the other blast-furnace owners must be also in a bad way. There are other companies who are paying no dividends this half-year, and at some of them—such as the Sheepbridge Company, which used to pay splendid dividends—the managers and directors are having unpleasant interviews with the shareholders, who had not a word to say so long as the returns were good.

## THE IRON MARKET

is somewhat disappointing, and were it not that the shipping season is now at its height, and shipments in consequence not unsatisfactory, it is to be feared that the position would be regarded by the much-suffering producer as almost helpless. Prices have now sunk to a very low level indeed, and ironmasters must occasionally regret the absence of the lively speculator, who, if he does no other good, is sometimes the medium of forcing up prices. But every branch of the market now is dull, though it must be said the Scotch market is the most hopeful. As regards that market, however, allowance must be made for the temporary firmness created by the Monkland Iron Company's report. The directors of that company have, it appears, been selling iron without profit, and now have resolved on withdrawing that boon to purchasers and insisting on better prices for the future. The resolve is a wise one, as far as the company is concerned, but it is hardly likely to produce any effect, seeing how much production is still in excess of requirements, whether at home or abroad. The market has, either from this or some other cause, shown greater firmness during the past few days, and warrants have been in fair request at about 41/10 @ 42/1, cash. Shipments reach a good total, owing, no doubt, to the cause already mentioned, and special brands, some of which are reported to be scarce, have risen, in some instances as much as 2/3 ton. The Middlesbrough market is characterized by a slightly improved tone, which seems to be due not so much, perhaps, to more inquiries as to the greater firmness reported from Glasgow. The business done was on the basis of 36/4½ for No. 3, and 33/6 for No. 4 forge. Pig-iron shipments are satisfactory, Germany and Scotland being two excellent customers. Manufacturers having, unlike their Scotch brethren, been fairly met by the local railway companies in the matter of carriage rates, are now striving to obtain further relief by a reduction in wages, though it is to be feared their view, so far from commending itself to the other side, will be strongly resisted. At the finished-iron works employment is irregular, but for bar iron of the best grades there is a fairly steady demand. In the engineering shops less activity is apparent, and the orders in hand, unless they happen to be specialties, are not of much importance. Prices of manufactured iron are weak, and to secure orders makers invariably make reductions. At Wolverhampton there seems to be a momentary lull in buying, though recent quota-

tions are stated to be well maintained. Sheet-makers have little reason to complain of the absence of specifications, being now so busy as to be able to impose a premium of 5/ a ton on early deliveries. Lending makers quote singles, £7. 1/ @ £7. 5/; doubles, £7. 10/ @ £7. 15/; and trebles an extra, £1. 1/ Iron gas-strip finds buyers at £3. 15/ and upward; good bedstead tube strip, £7. 10/ and steel-nail strip, £7. 5/ @ £7. 10/. Old rails are very dull. Stocks in dealers' hands continue light, as our railway companies are not free sellers at the low rates now ruling. In iron rails there is nothing doing, nor, it may be added, is there any likelihood of an improvement. Heavy wrought scrap iron is quiet at 43/ @ 44/3 ton, f.o.b. London, &c., weights to be checked and quality approved at time of shipments. Of crop ends there are very few in stock, the short make of rails naturally reducing the supply.

## SCOTCH PIG IRON

has undergone an improvement since my last, a change which is understood to be partly owing to better inquiries for shipments abroad, and partly owing to the resolve of the Monkland Company to revise prices. In warrants a considerable turnover has been done at prices up to about 42/, while special brands have further stiffened to the extent of 1/ @ 2/3 ton. There are now 94 furnaces at work in Scotland, as against 115 a year ago, 7 being now on hematite and 1 on silicious pig, leaving 86 on ordinary pigs. Shipments were comparatively 2856 tons better last week, but the total decrease to date this year has been 65,125 tons, most of which has arisen in respect of lots to foreign destinations. Middlesbrough pig iron imports into Scotland have decreased by 6702 tons. In Connal's stores there are now 584,237 tons, against 586,617 tons a year ago, last week's decrease having been 530 tons.

## INDUSTRIAL ITEMS.

## NEW HAMPSHIRE.

The Jenning Machine Company held their annual meeting in Nashua and have elected the following board of directors: William A. Russell, Lawrence; Thomas S. Newell, Charles T. Fairbanks, Edward L. Chaffee, Boston; Samuel L. Sprague, John A. Brown, Providence, R. I.; Henry N. Bigelow, Clinton, Mass.

## MASSACHUSETTS.

The Cunningham Iron Works, Boston, have closed a contract with the commissioners of the town of Weymouth to build a reservoir 40 feet in diameter by 62 feet high, this being the largest of the kind in the New England States. It will be constructed of refined boiler-plate iron, with a tensile strain of 50,000 per square inch, and to weigh when completed 113 tons. They have also contracted with the Brush Electric Lighting Company for three 72-inch steel boilers for their new station on Ferdinand street, Boston.

It is said that all the manufacturing establishments at Chicopee Falls, in whose products iron and steel form a part, will reduce hours of labor from ten to eight. It is occasioned by overproduction, and is the first of any importance since 1873, when the movement was not so general. The concerns which take up with the new order of things are the Lamb Knitting Machine and Massachusetts Arms Company, Belcher & Taylor Tool Company, J. Stevens & Co. Rifle Company, Chicopee Falls screw shops, and the Page & Blake needle works.

A new company, known as the Eureka Axle Company, have recently been established in Lynn, and are said to promise well. The company start with a capital of \$500,000, divided into 50,000 shares.

## CONNECTICUT.

Kent Furnace is out of blast, rebuilding.

## PENNSYLVANIA.

The employees at Dunbar Furnace, Fayette County, have refused to accept a reduction of 10 per cent. in wages, taking effect October 1, and a strike will likely ensue.

Cofrode & Saylor, of the Pottstown Bridge Works, have announced a reduction of 20 per cent. in the wages of their employees. This brings the wages of the laborers down to \$1.04 per day.

Wampum Furnace, a number of tenement houses and 202 acres of land were sold by Sheriff Douds, of Lawrence County, last week, for the sum of \$76. The property was subject to a mortgage of between \$50,000 and \$60,000.

It is the intention of the Bethlehem Iron Company to extend the eastern end of their new mill several hundred feet, which will greatly facilitate their work. The extension will be built of iron. Only four blast-furnaces are in operation, but the indications are that an additional furnace will soon be blown in.

The Reading Artistic Glass Works will go into operation this week. The building and the furnaces having been finished, fire was built in the furnaces on October 2 to remove the moisture, and a trial of the glass furnace was to be made either on Monday or Tuesday of this week, and the whole works will soon be in operation. The building is 65 feet square, two stories in height and surmounted by a mansard roof. There are three furnaces, one for making glass from sand and chemicals, another for the manufacture of colored articles from the glass, and the third for tempering the manufactured articles. The furnace for the making of glass is 7 feet square and 18 feet high. It has a capacity of 1500 pounds of glass every 24 hours. It contains five crucibles. The glory hole, containing six openings, is the furnace where the glass-blowers will work in the manufacture of useful and ornamental articles. The tempering furnace is 40 feet long. Some 30 hands will be employed in the glass works.

The Bridgewater Gas Company, of Beaver County, struck a second big well in Hope-well Township, on September 30. The new well is half a mile distant from their well No. 1, and is the fourth well they have put down. The drill penetrated the gas vein at a depth of 1140 feet. The flow is as strong

as that in Well No. 1, which has a pressure of 500 pounds to the inch in 6-inch pipes. This new well, with the one they had before, will, it is estimated, be sufficient to furnish fuel and light for every factory and dwelling in Beaver County.

The success of the Babcock & Wilcox water-tube boilers using blast-furnace waste gas as fuel at the Lucy Furnaces, Pittsburgh, is leading to other trade in this direction. Sales have recently been made to blast-furnaces as follows: Pottsville Iron and Steel Company, Pottsville, Pa., 150 horse-power; Woodward Iron Company, Wheeling, Ala., 292 horse-power; McCormick & Co., Harrisburg, Pa.; Paxton Furnaces, 416 horse-power; Lochiel Rolling Mill Company, Harrisburg, Pa., 416 horse-power; total, 1274 horse-power. Within the last 60 days other sales of boilers have been made by the Babcock & Wilcox Company to the extent of 5275 horse-power, making a grand total, with the above, of 6552 horse-power.

The Hartman Steel Company, of Beaver Falls, deny in toto the statement recently made in these columns to the effect that they had presented to their workmen for signature an ironclad oath binding them to have no further dealings with the Amalgamated Association, but that they had afterward withdrawn it. The company further say they have had no trouble with their men since August 1, everything working smoothly. Out of about 140 strikers but 12 were permitted to return to work on any conditions, and most of the others are asking to be re-employed.

The following paragraph, which is going the rounds of the press as an Associated Press dispatch from Easton, is pronounced incorrect in almost every particular by the parties concerned: "The Glendon Iron Company have been idle for the past two months on account of the general depression in the iron trade. It is now nearly ready to blow in its No. 5 Furnace, and another furnace at the works is being lined and will be blown in as soon as everything about it can be placed in running order. Stack No. 3, which has been running for several years, will be blown out for repairs as soon as the fires are lighted in the idle furnaces. No steps have been taken by the company to start their furnace in South Easton, and, as no coal boats have been unloaded there this summer, it is likely that the stack will be idle all winter. This furnace was blown out last spring. The Andover Iron Company, in Phillipsburg, have blown out the last furnace they had in blast, and according to the present outlook all the stacks at the works will be idle this winter." We reproduce this item and make the statement concerning it, because there are so many false news items now being circulated about iron works that it is well to know that most of them are sensational and not based upon actual facts, notwithstanding an apparent wealth of details which makes them seem to be true.

The Spring City Bloom Works, which went into operation a few days ago, are running very successfully. The machinery and smelting furnaces work admirably, and the blooms manufactured are of an excellent quality of iron.

The nail factory of the E. & G. Brooke Iron Company, of Birdsboro, manufactured during September 19,320 kegs of "Anchor" brand nails, an output which, in consideration of several days' stoppage of the works, evidences the large productive power of the factory.

It is understood that the puddle mill of the Allentown Rolling Mill will resume operations next week, after having been idle for three months.

## PITTSBURGH AND VICINITY.

The firm of Breed & Edwards, plow manufacturers, whose place of business is at the corner of Penn avenue and Water street, made an assignment on October 2 to Ogden M. Edwards, Pittsburgh. No records of indebtedness are made, and no exemptions are entered up, but Mr. Breed states that the firm will be able to meet all of their obligations. The liabilities are said to be about \$75,000, while it is claimed the nominal assets are over \$100,000. The direct cause of the suspension was the inability of the firm to meet matured paper on which no extension could be obtained. It is claimed that the firm have not over half a dozen creditors, the largest, it is understood, being William Thaw, father-in-law of Mr. Edwards, Eastern manager of the Union line. Mr. Breed says he loses everything he has by the collapse.

Abel, Smith & Co. are preparing to rebuild their glass-house.

The Black gas well, at McKeesport, is being cased and the surface gas all shut off. This well is a test one, and, if gas exists in paying quantities, others will probably find it, as a number of other wells are being put down near the Black Well.

A strong flow of gas has been struck at the well of J. Painter & Sons, on the South Side.

One of the nail rolls in the mill of Shoenberger & Co.'s broke on September 29, causing a temporary cessation of work.

The Westinghouse Gas Company have made a contract for pipe with the Pennsylvania Tube Works to lay a main from the Butler and Tarentum gas district. The contract calls for the delivery of 3 miles of pipe daily, the delivery to commence on Monday next, when the digging of trenches and laying of pipe to the city will be commenced and pushed to completion.

Mr. Alexander Bradley has consented to serve as umpire for the new Coal Trade Tribunal. The board is now ready for work.

Dilworth, Porter & Co. have asked their employees to accept a 10 per cent. reduction in wages, owing to dullness of trade. Some of the employees are members of the Amalgamated Association. It is not known what course will be taken by the men.

Owing to competition and depression of business, Oliver Bros. & Phillips have notified their employees of a reduction of 12½ per cent. in wages, applying to all labor

except that governed by the wages scales. The men, at a conference held with the firm, offered to accept a 5 per cent. reduction, but this, it is understood, will hardly be accepted by the firm.

The Westinghouse Well No. 5 has struck gas, and came in strong last week. It is down 1600 feet.

The stove molders' union is making efforts to end the strike—or, rather, lock-out. Some days ago the molders advised the employers that they were willing to go to work at a reduction of 10 per cent., which concession, receiving no attention, they have since amended to 15 per cent. It is not likely that the foundries now running with non-union men will hereafter recognize the union.

The drill at Chess, Cook & Co.'s well, near the foot of Nineteenth street, South Side, has been stopped at a depth of 1530 feet. Nothing more will be done with the well for the present.

The miners and coke drawers at the Morrell and Cambria Coke Works, in the Connelville region, have struck against a proposed reduction of 10 per cent. in their wages. The rate of wages paid, which is uniform throughout the region, is 35 cents per wagon for digging coal, and 60 cents per oven for drawing coke.

## OHIO.

Trouble appears to be brewing at the works of the Cleveland Rolling Mill Company. A general reduction of 10 per cent. has been made in all the departments of the company's works, affecting the monthly receipts of 2000 workmen from \$4 to \$10 each per month. It is usual to make a cut in wages at this time of year, notice being given by means of posters of the intention of the proprietors. This time no such notice was given, the information being conveyed to the men by word of mouth from the foremen in the different departments. The Knights of Labor in the Eighteenth Ward, where the mills are situated, are discussing the advisability of striking. Threats have been made by letter that unless the rate of wages is restored to the old figures the mills will be burned.

The Etna Furnace, Ironton, lost 1000 cords of wood by fire last week during a high wind. The loss is covered by insurance.

A special gold medal has been awarded the Bower-Barff "rustless" exhibit at the Cincinnati Exposition.

The work of rebuilding the Novelty Iron Works, Cleveland, destroyed in the recent great fire, has been begun.

The Ohio Valley Foundry Company, Bellaire, will this season erect one two-story frame, 60 x 60 feet; one one-story frame, 30 x 20 feet, and add 10 x 20 feet to another two-story frame. They will also put in one 20-horse-power engine, 32 feet of shafting, pulleys, drill press, emery-wheels and polishing machines.

The extensive brass works at Lorain, operated by the United Brass Company whose offices are in Cleveland, closed down last Monday for 60 days.

## MISSOURI.

The Shickle, Harrison & Howard Iron Company, of St. Louis, are working on a 7000-ton order of iron pipe for the city.

The stockholders of the Harrison Wire Company have voted to increase the bonded debt of the company from \$150,000 to \$250,000. This has probably been done with a view to resuming operations.

## ILLINOIS.

The Tibbles Manufacturing Company have lately been incorporated for the manufacture of an improved sewing machine. Mr. C. E. Tibbles is president, and J. A. Stafford, secretary. Their works are at 13 South Canal street, and the company are building new tools, &c.

## VIRGINIA.

Mr. D. S. Cook, formerly of Pennsylvania, and the builder of Calhoun Furnace, has almost completed his new coke furnace at Wilton, on the Richmond and Allegheny Railroad, and will blow it in about November 1. The furnace has been built from the material of old Princess Furnace, which was at Ashland, Ky., and will bear the same name. It will have a capacity of about 500 tons per week.

## WEST VIRGINIA.

Work is progressing rapidly on the new buildings of the Belmont Nail Company, Wheeling.

The Benwood Iron Works are running all their machines, part on iron and part on steel nails.

## ALABAMA.

A Birmingham establishment have been awarded the contract for 140,000 iron chains, to be used in the improvement of the Mississippi River between Memphis and Vicksburg. There were bidders from the principal Western cities.

## GEORGIA.

Robert Winship, George Winship, Charles R. Winship, R. E. Rushton, C. J. Hancock and F. H. Schenck have organized in Atlanta the Winship Machine Company, to manufacture machinery. Paid-up capital \$200,000, with privilege of increasing to \$500,000.

## TENNESSEE.

David C. Richards and John B. Guinn have recently started the Enterprise Machine Works, Knoxville, for the manufacture of steam engines, circular saw mills, and all kinds of grist-mill machinery; also shaftings, pulleys and hangers.

## MARYLAND.

Chas. Zies, 89 and 91 South Fremont street, Baltimore, has just established a machine shop.

A. Schultz & Co., Baltimore, have enlarged their factory for making canners' tools, and will put in new machinery.

## NORTH CAROLINA.

The Salem Iron Works, Salem, will add a boiler shop.

## MORE NEWS OF THE Rocking Grate Bar.

PATENTED JANUARY, 1884.

Over Five Hundred Sets Already Under Steam Boilers  
in the United States.

PRONOUNCED A "GRAND SUCCESS."

See what the Chicago, Rock Island and Pacific R.R. Co. are doing:

"We have had them in use some ten months, and are now putting them in all engines as fast as they come in. With your Grate we can run our engines the long run, 228 miles, without cleaning the fire, and when the engine gets through the fire is as clean as when starting out."

Himebaugh, Merriam & Co. say:

"We now use nothing but slack that costs about one-half as much as lump coal, and a carload of slack lasts us fully as long as a carload of coal, which makes the cost of running our boilers with your Grate only about one-half of what it is when run with other coal. They work very nicely, and fire easier than the old-style Grate."

The Chicago, Wilmington and Vermillion Coal Co. say:

"They are giving us as much steam from the poorest slack as we formerly got from the best nut coal."

Bloomington Pork Packing Co. say:

"We could not have got the necessary steam to run our business without them."

The Mound City Distilling Co. say:

"We are burning no more of the lowest-priced lump coal in the market than we were formerly obliged to use of the highest-priced—saving a good profit, 33 per cent. in use at their Distillery at St. Louis, Mo."

Mr. C. P. Buckingham, Pres. The Chicago Steel Works, says:

"A decided saving over the old grates. Used them seven months, and they have given satisfaction in every respect."

Shumway, Burgess & Co. say:

"Have increased our steam supply over 30 per cent., and relatively reduced our coal bill fully 20 per cent."

Ten months in use at their Bolt Works, Chicago.

Calumet Iron and Steel Co. say:

"Using no more slack to get the same amount of steam that we have been obtaining from lump coal from the old grates."

Five months in use at their Works, Chicago.

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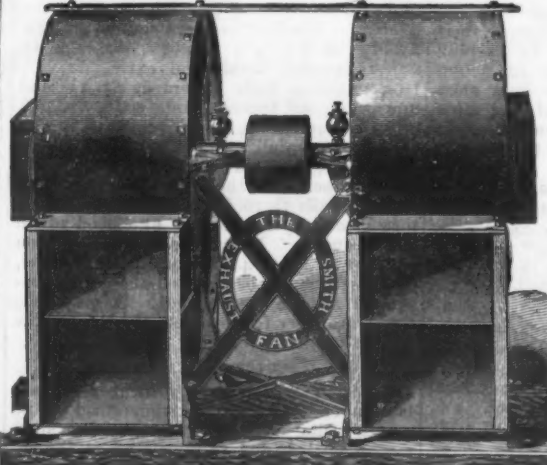
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The Fans are specially adapted for removing dust from Emery and other Polishing Wheels, Grindstones and Cleaning Mills; Smoke and Gas from Machine Shops, Steam from Dyeing Establishments, Ventilating Buildings, Tunnels and Mines; removing Bark and Dust from Mills in Tanneries; Shavings and Dust from Planing Mill Machinery and other Wood-Working Establishments.

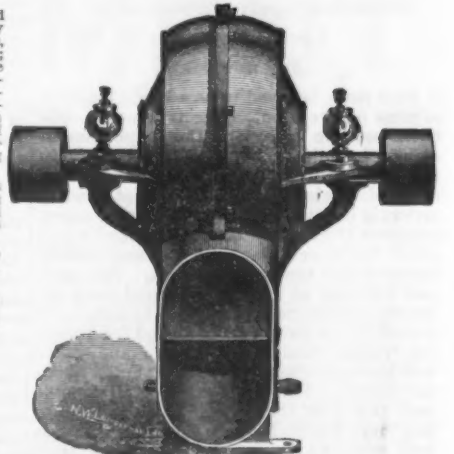
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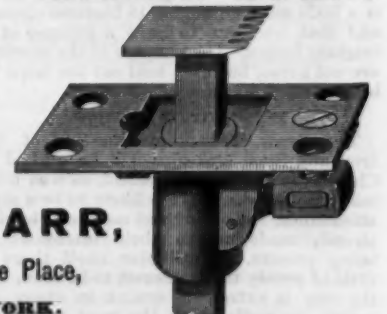
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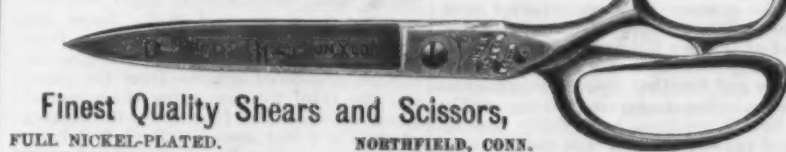
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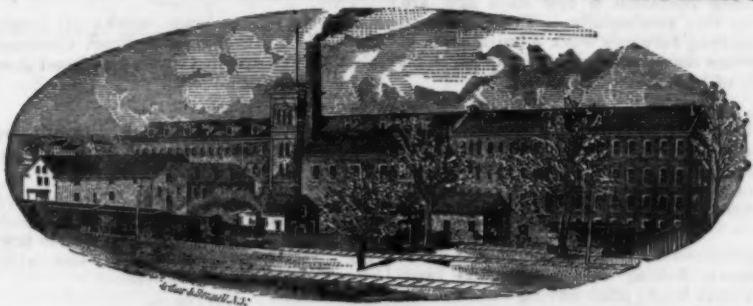
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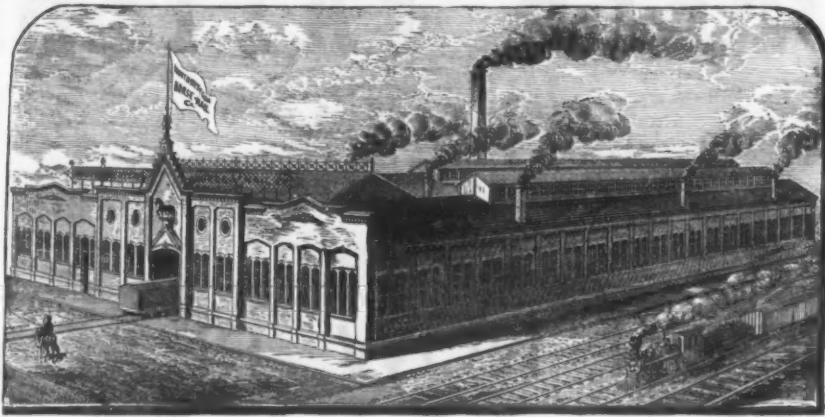
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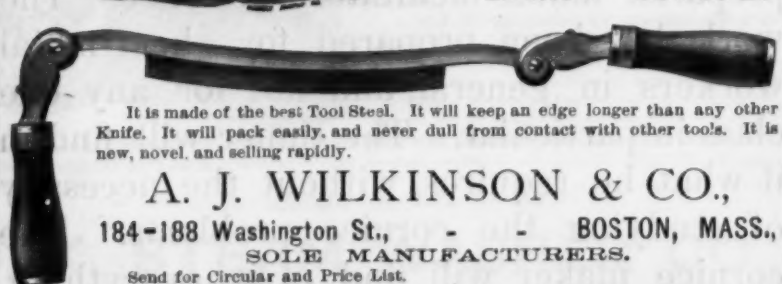
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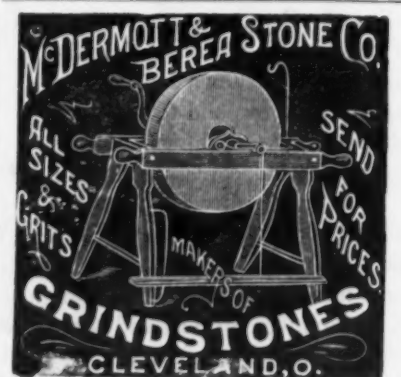
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*Pattern Problems.*

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G H K, of Fig. 426, is presented one of the sets of conditions which necessitate a change of profile, in either the horizontal or raking molding, in order to accomplish a miter joint at the point indicated by I H in the plan. In other words, the conditions are such that with a given profile, as shown by A' in the raking molding, the horizontal molding forming the return will require to be modified, as shown by the profile A, in order to form a miter upon the line I H in the plan; or, if A' is established, A' will have to be constructed to correspond with A. The reason for this is quite obvious. The distance across the raking molding at right angles to its lines is greater than the corresponding distance across the return molding at right angles to its lines; therefore the projection in the cornice, as shown by the profile A', must be distributed through a smaller space than is shown in the profile A. In this problem we assume that the pitch of the raking cornice B C is established and that the profile A is given, and from these parts it is required to develop the modified profile. We have the choice of placing the normal profile in the horizontal return and making the raking profile correspond with it, or of placing the normal profile in the raking molding and making the profile of the horizontal molding agree with it. Although the principle upon which these operations is performed is identical in both, the demonstration will be made clearer if each is fully illustrated independent of the other. In this problem and the following one, therefore, we show the several steps necessary to take in modifying the profile, and in cutting the several patterns required to form the structure indicated by the elevation and plan. First we will assume that the normal profile occurs in the raking cornice, and that the horizontal profile is to be modified to suit it. We then proceed as follows: Draw a representation of the normal profile in the raking cornice, as shown by A', placing it to correspond to the lines of the cornice, as shown. Draw another profile corresponding to it in all parts, directly above or below the foot of the raking cornice, in line with the face of the new profile to be constructed, placing this profile A so that it shall correspond with the lines of the horizontal cornice. Divide the profiles A and A' into the same number of parts, and through the points thus obtained draw lines, those from A' being parallel to the lines of the raking cornice, and those from A intersecting them vertically. Through these points of intersection trace a line, which gives the modified profile, as shown by A'. Then A' is the profile of the horizontal return, indicated by G H I F in the plan. It is also the elevation of the miter line I H of the plan for the several patterns involved. We therefore proceed as follows: At any convenient point at right angles to the lines of the raking cornice lay off the stretchout M N of the profile A', through the points in which draw measuring lines in the usual manner. Place the T-square at right angles to the lines of the raking cornice, and,

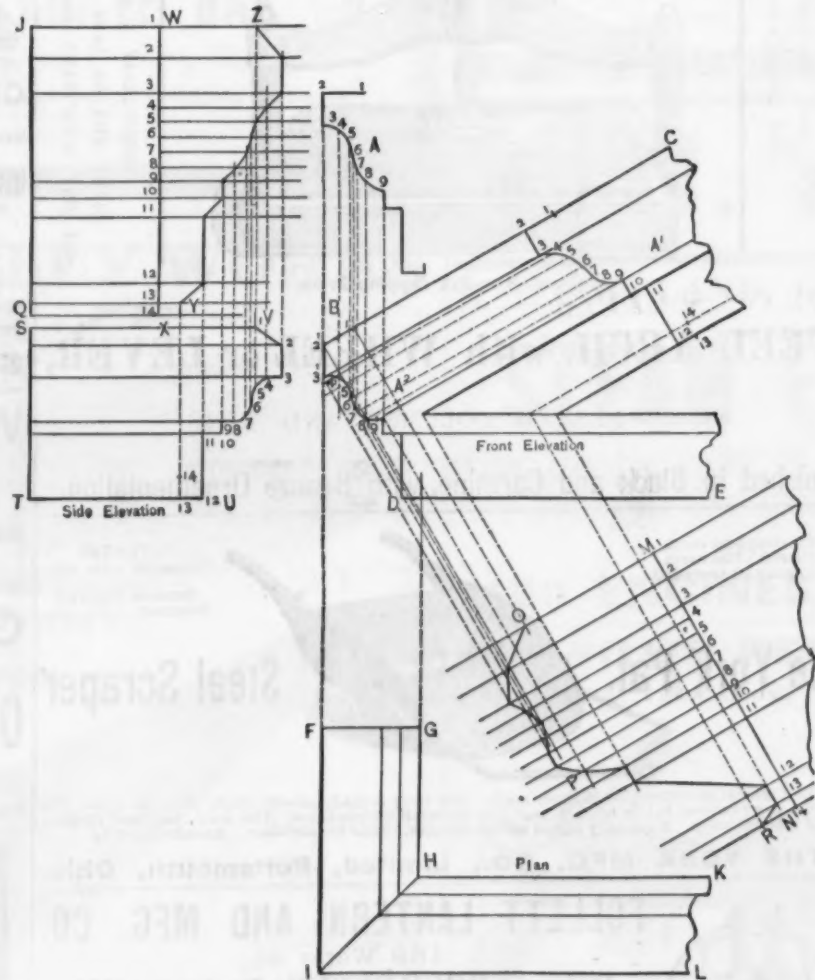


Fig. 426.—To Ascertain the Profile of a Horizontal Molding Adapted to Miter with a Given Inclined Molding at Right Angles in Plan, and the Several Miter Patterns Involved.

and Technicalities; (2) Drawing Tools and Materials; (3) Geometrical Problems; (4) The Art and Science of Pattern Cutting; and (5) Pattern Problems. These titles sufficiently indicate the subject matter of the several parts.

The specimen page here shown is from the last division of the book, entitled "Pattern Problems," and which embraces more than one-half of the entire work. It shows the manner in which practical questions are treated. The list of problems demonstrated is very extensive, and embraces almost everything of common occurrence in the sheet-metal trades, with enough of the exceptional to show methods adapted to special requirements. This chapter, in short, is a ready reference book for all who have pattern cutting to do. Each demonstration is complete in itself. A carefully prepared index facilitates reference. The work has been prepared for sheet-metal workers in general, and not for any one class in particular. The tinner will find in it what he requires, without the necessity of studying the cornice problems. The cornice maker will find in it everything, from a simple miter to the most complex problems, so arranged as to meet his requirements without the necessity of going through portions in which he is not interested. The general student will find the entire subject presented in such a manner as will facilitate systematic study. The rapidity with which each edition has been exhausted, and the universally favorable

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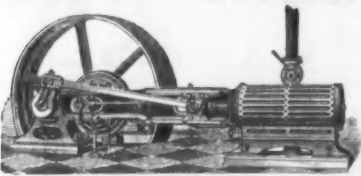
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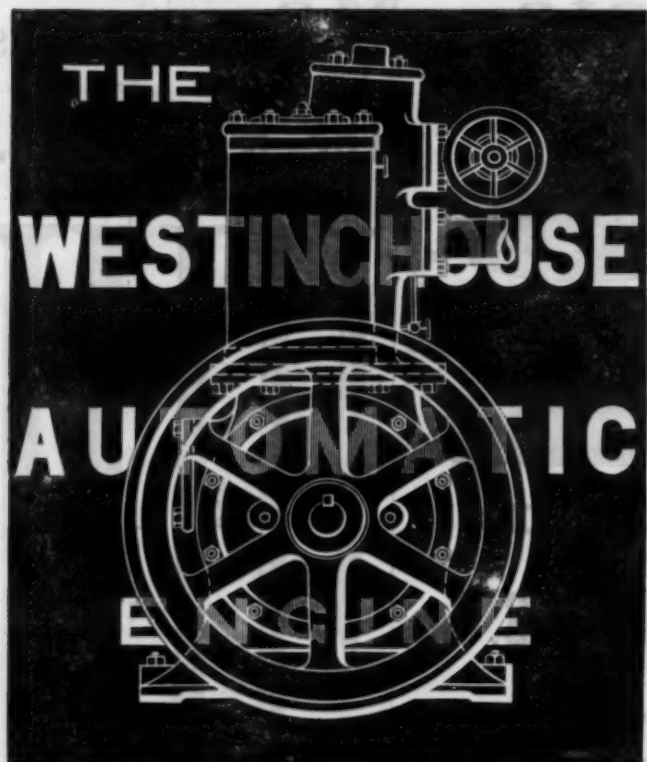
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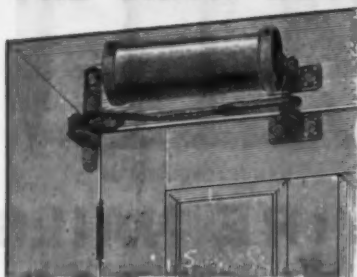
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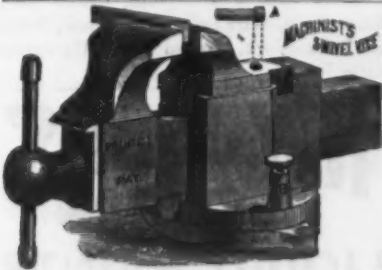
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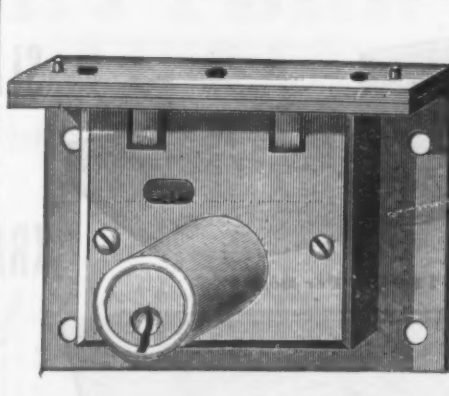


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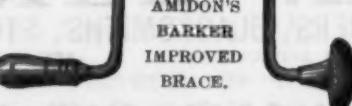
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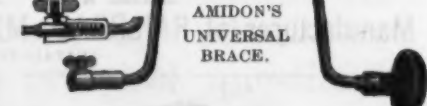
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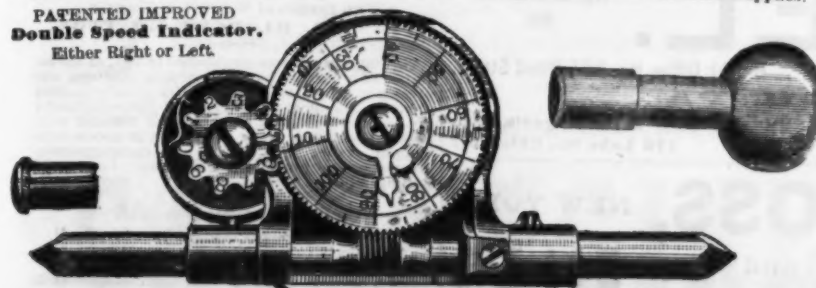
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This list excludes all ordinary trade announcements proper, and is strictly confined to trade-marks and brands, whether blocks, electros or other appliances for illustrations, with just sufficient letterpress to describe the kind of article to which the mark, &c., is applied, and the names and addresses of the owners or lawful users. For the sake of uniformity in space and charges, each mark occupies a space measuring 1 inch deep by 1½ inches wide, and the uniform charge is \$2.50 (10s.) only for each such space, payable in advance unless we have already an open advertising account with the firm giving the order.

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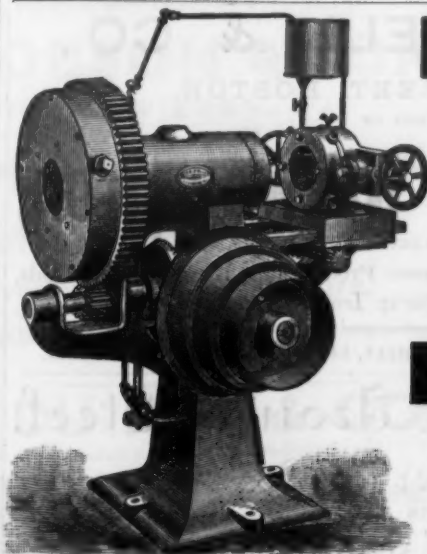
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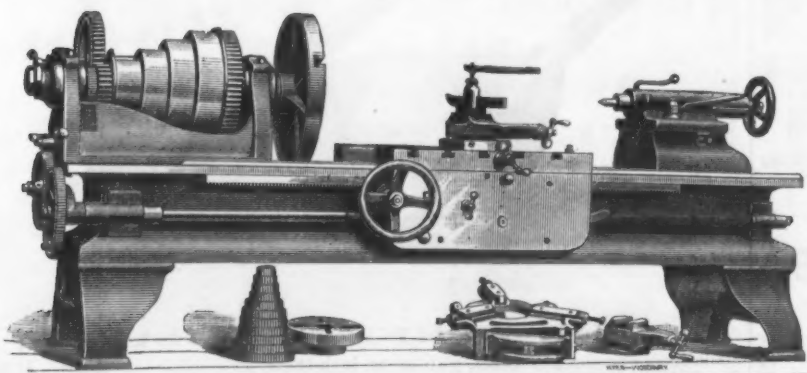
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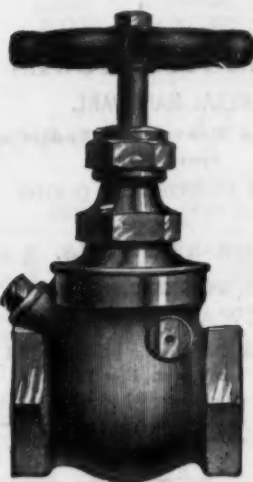
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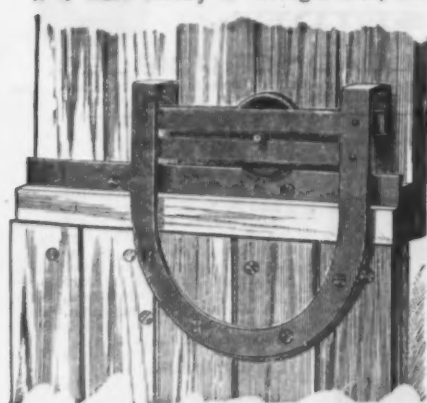
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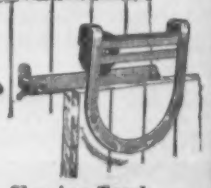
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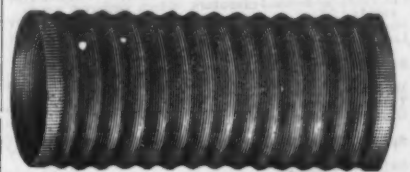
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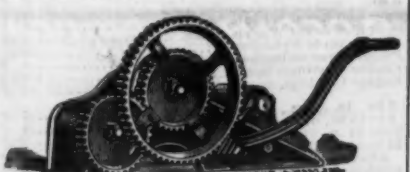
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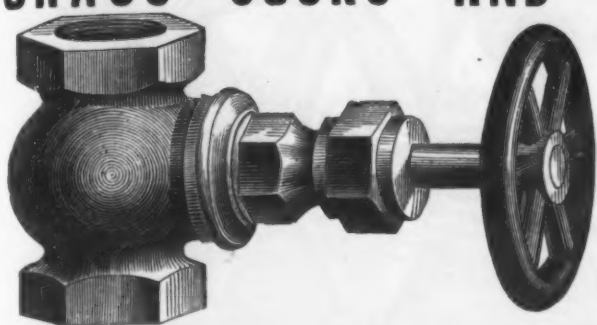
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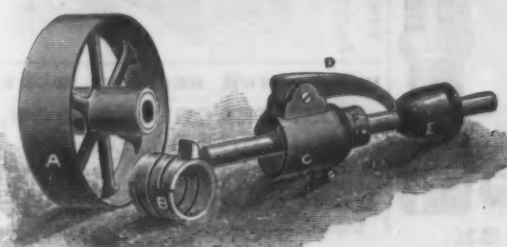
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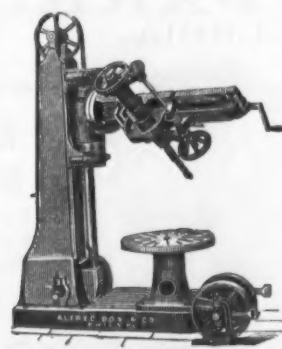
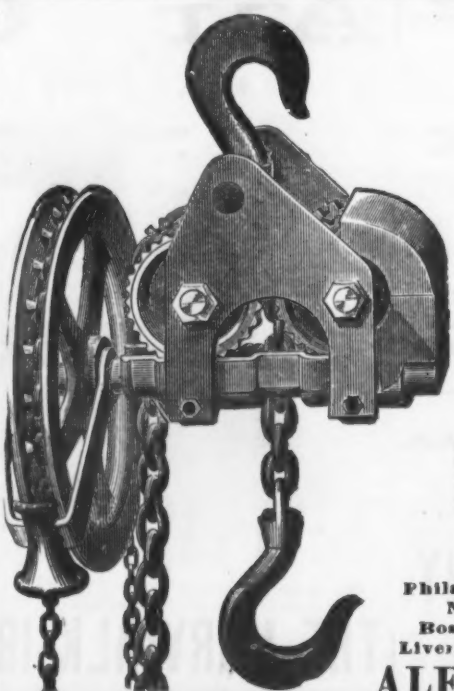
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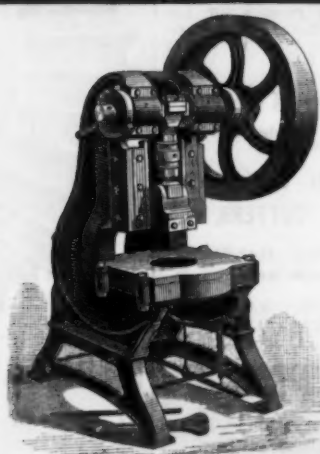
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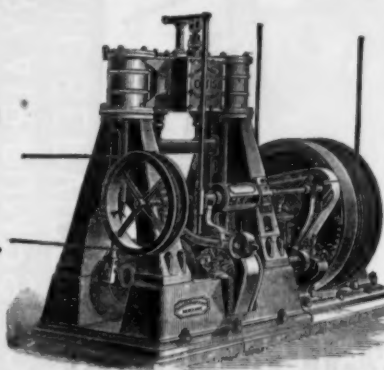
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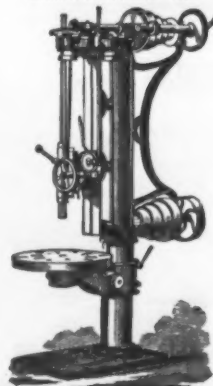
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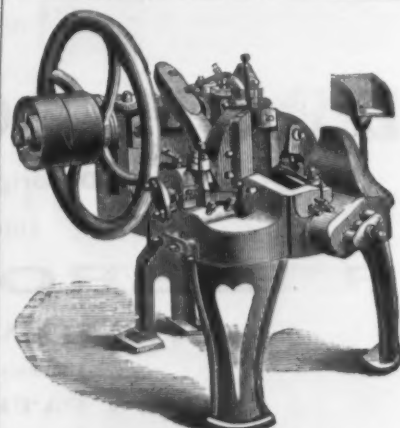


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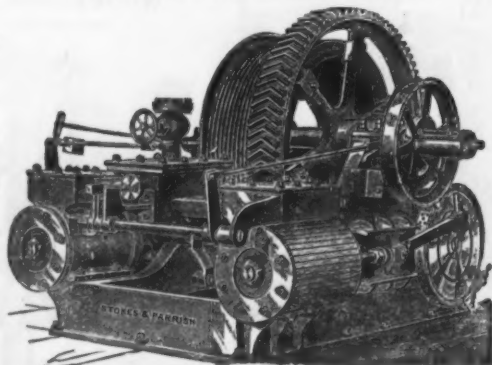


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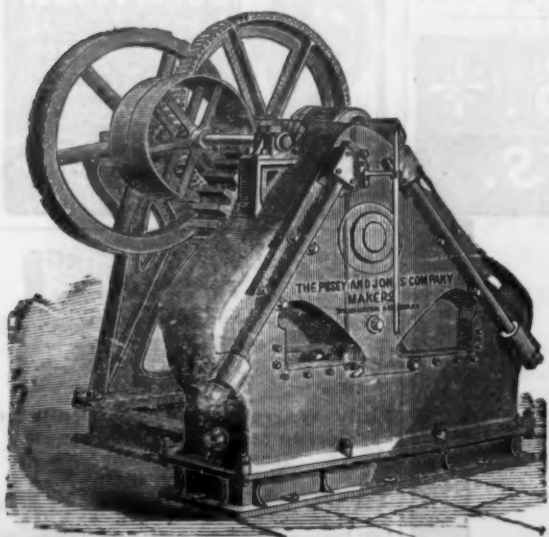
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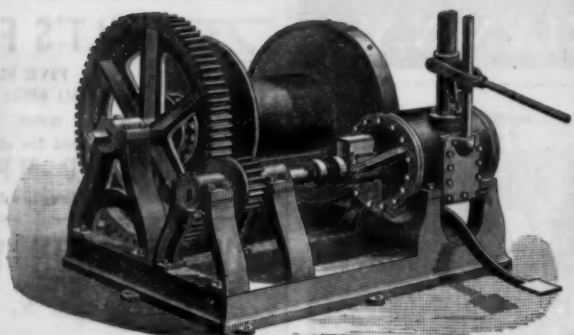
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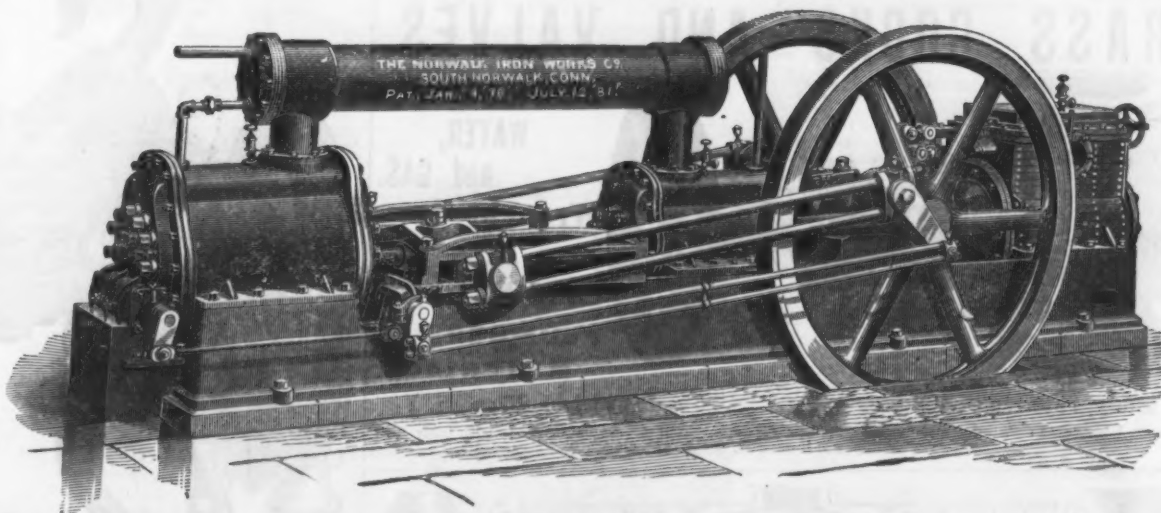
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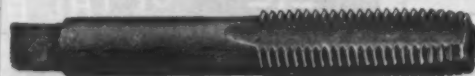
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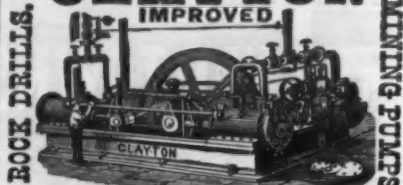
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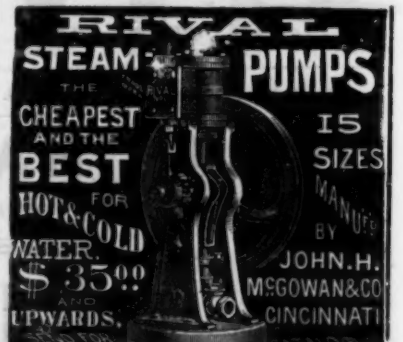
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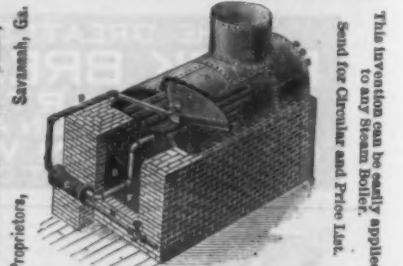
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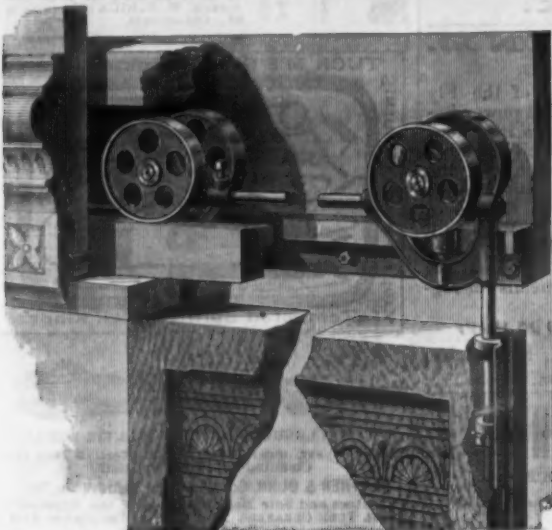
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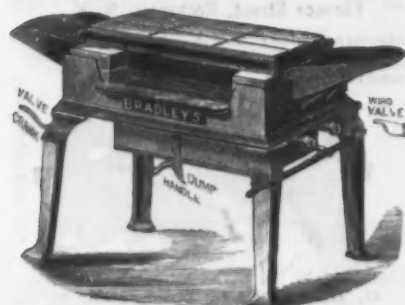
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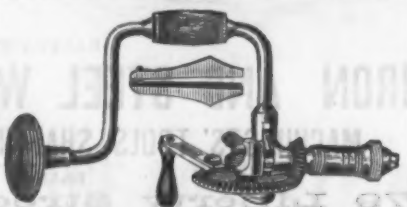
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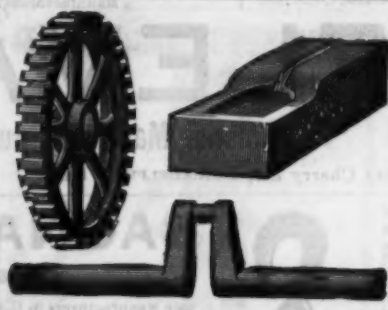
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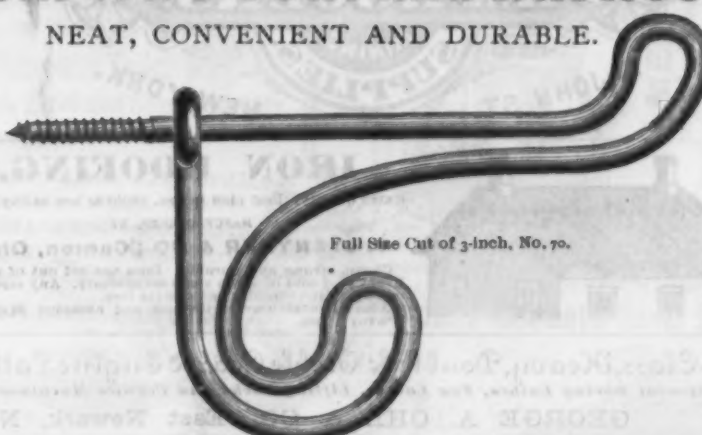
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